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8/31/94
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**REGION 5****77 WEST JACKSON BOULEVARD****CHICAGO, IL 60604-3590****AUG 31 1994****REPLY TO THE ATTENTION OF:****MEMORANDUM****DATE:****SUBJECT:** ACTION MEMORANDUM Request for a Non-Time-Critical Removal Action and Exemption from the \$2 Million Statutory Limit at the Jennison-Wright Site, Granite City, Madison County, Illinois Site ID# WK**FROM:** Brad Benning, On-Scene Coordinator
Emergency Response Section II *Chel Zell. For BS***THRU:** William E. Muno, Director
Waste Management Division *WEM***TO:** Valdas V. Adamkus
Regional Administrator**I. PURPOSE**

The purpose of this memorandum is to request an exemption from the \$2 Million statutory limit and document approval to expend up to \$2,452,000 to abate an imminent and substantial threat to public health and the environment posed by the presence of volatile and semi-volatile organic compounds including polynuclear aromatic hydrocarbons (PAHs), pentachlorophenol (PCP) and chlorinated dioxin and furan compounds at the Jennison-Wright site in Madison County, Granite City, Illinois.

The response action proposed herein will mitigate threats to public health, welfare, and the environment posed by the presence of uncontrolled hazardous wastes located at the site. The proposed removal action is considered a non-time-critical removal action and is intended to address only those areas that potentially pose the greatest risks to human health and the environment, i.e. areas containing highly concentrated waste materials and/or contamination that has a high potential for migration off site.

Due to the presence of various chlorinated dioxin and furan compounds and the associated high cost of disposal, the cost of the removal action will exceed the \$2,000,000 ceiling imposed on removal actions. Based on this an exemption from the \$2 Million ceiling is requested to allow for this removal action, enabling the State of Illinois to mitigate the existing threats posed by the contamination on and off site.

The site is being proposed for the National Priorities List (NPL) and is presently a Region V pilot Superfund Accelerated Cleanup Model (SACM) site. The State of Illinois has been designated the lead on this site; funding for hazard mitigation will be provided to the State of Illinois and they will be responsible for execution of all activities named in this Action Memorandum.

The CERCLIS ID number for the site is ILD006282479

II. SITE CONDITIONS AND BACKGROUND

A. Physical Location

The Jennison-Wright facility is located at 900 West 22nd Street in Granite City, Illinois. The site is approximately 1 mile east of the Chain of Rock Canal, which flows into the Mississippi River.

More precisely, the site is in the NE 1/4, SE 1/4, Section 13, T3N, R10W, of Madison County, Illinois (see figure 1). The site is adjacent to the Granite City Manufacturing Belt Railway in a mixed residential-industrial neighborhood. It is bisected by 22nd Street with wood storage areas located north and facility process areas located south of the street.

B. Site Description and Background

The Jennison-Wright site is made up of approximately 20 acres of land within the corporate boundaries of Granite City, Madison County, Illinois. The facility is bordered by the Norfolk-Southern Railroad lines to the east and south, residential areas to the west and property occupied by the Illinois American Water Company, a residential area and 23rd Street to the north. Operations at the facility began prior to 1921 and continued until 1989. Three distinct companies operated at the site during its history as a wood treating site: Midland Creosoting Company (prior to 1921-1940), The Jennison-Wright Corporation (1940-1981) and 2-B-J.W., Inc. (1981-1989), authorized to do business as Jennison-Wright Corporation. Jennison-Wright Corporation filed for Chapter 11 Bankruptcy in November 1989, with an auction held in 1990 to sell the remaining equipment and materials remaining at the site. The

site has remained vacant since 1990, except for the occasional trespasser or scavenger.

The Jennison-Wright Corporation site is a triangular shaped facility that is bisected by 22nd Street, creating north and south portions of the site (see figure 2). The area north of 22nd Street was used for tie trimming, treated tie off-loading, untreated tie storage and treated tied storage. The company's process areas occupied the area south of 22nd Street, treating wood products (railroad ties and wood block flooring) with pentachlorophenol, creosote and zinc naphthenate. Creosote was used for treating wood products through 1989, pentachlorophenol was used from 1974 to 1985 and zinc naphthenate was used from 1985 to 1989.

"Jennite", an asphalt sealer product composed of coal tar, pitch, clay and water, was manufactured in the southeastern corner of the facility. The process began in the early 1960's and continued until the summer of 1986 when Jennison-Wright sold the Jennite process to Neyra Industries. Neyra Industries leased the portion of the facility used by Jennison-Wright for the sealer, and continued manufacturing the asphalt sealer until 1989.

C. Current Site Conditions

Process liquids, including residual unused wood-treating solution and spent wood treating wastes, are present in several storage tanks on the site. Visible staining and contaminated surface soils are evident in many areas of the site, including a waste disposal area at the east boundary of the site and a stockpile of contaminated soil at the northeast corner of the site. Contamination from the soil stockpile at the northeast corner of the property has migrated off site and along the drainage swale east of the site fence. Analytical results for soil, waste material, and groundwater samples collected at the Jennison-Wright site indicate the presence of volatile and semi-volatile organic compounds including polynuclear aromatic hydrocarbons and pentachlorophenol. Chlorinated dioxin and furan compounds have also been detected in soils and sludge on and off site.

The IEPA placed a Seal Order on the site in November, 1990 pursuant to Section 34 of the Illinois Environmental Protection Act, Ill. Rev. Stat., Ch. 111 1/2, in an attempt to limit access by unauthorized personnel. Although the site is surrounded by a chain-link fence, signs of trespassing such as broken windows and holes in the fence have been observed on several occasions.

In order to address potential health risks posed by human exposure to the contaminants present on site, and to minimize the potential for continued migration of contaminants from source areas, it was determined jointly by the Illinois Environmental Protection Agency

(IEPA), and the United States Environmental Protection Agency (USEPA), that a non-time-critical removal action was necessary and appropriate for specific source areas at the site.

In January 1994, a Draft Final Engineering Evaluation /Cost Analysis (EE/CA) was submitted by the IEPA consultant, Ecology and Environment (E&E), with a public hearing following in May of 1994. Although contamination is visible in many areas of the Jennison-Wright site, the removal action is intended to address only those areas that potentially pose the greatest risks to human health and the environment such as highly concentrated waste materials or contamination that has a high potential for migration off site.

The IEPA, and the USEPA propose that the removal action address source contamination in the following areas:

1. Creosote and aqueous wastes in two partially filled 160,000 gallon above ground tanks.
2. Creosote/tar wastes and contaminated soil in a waste disposal area (Jennite pit).
3. Aqueous and oily pentachlorophenol wastes in a buried tank (believed to be a 12,000 gallon railcar).
4. 174 drums abandoned on site containing solid and liquid wood treating waste.
5. Oil/tar in a 12,000 gallon railcar at the north end of the site.
6. Wood treating constituent contaminated soil stockpiled at the northeast corner of the site and adjacent off site drainage swale impacted by runoff from the stockpile.

D. State and Federal Authorities' Role

On April 8, 1993 the IEPA made a presentation to the USEPA Regional Decision Team (RDT) to request assistance in mitigating the environmental hazards at the Jennison-Wright site. IEPA requested that the site be included in the Superfund Accelerated Cleanup Model (SACM) program and that the State be allowed to act as the lead on the project. The outcome of this presentation determined that the IEPA would be the lead on the project, that they would conduct the EE/CA, and all enforcement actions utilizing State authorities.

On September 16, 1993, the IEPA issued a notice pursuant to Section 4 (q) of the Illinois Environmental Protection Act, notifying PRP's

of their responsibility to conduct the identified removal actions at the Jennison-Wright site. On May 12, 1994 PRP negotiations ended following an official thirty (30) day period. To date, offers have been made by two (2) out of ten (10) PRP's. Based on the unresponsiveness of the majority of the PRP's, a decision was made to utilize Superfund money to conduct the non-time-critical removal action. A draft cooperative agreement will be forwarded to USEPA by IEPA to request funding to conduct the removal activities.

III. THREAT TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

Conditions present at the Jennison-Wright site constitute an imminent and substantial threat to public health and welfare and the environment, based upon considerations as set forth in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Section 300.415 (b) (2), specifically:

a) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;

Despite the presence of a fence, trespassers are gaining access to the Jennison-Wright site, which includes deteriorating drums, buildings, and surface contamination on the site. The potential for direct exposure to human and animal populations exists. Many of the buildings on site have been illegally entered with access gained to the site through doors and windows being frequently broken open as well as climbing and cutting the site fence. Inhalation of vapors and particulates from exposed surface contamination is also a concern to local residents as dioxin/furans, and PCP contamination has been detected off site.

b) Hazardous substances or pollutants or contaminants in drums, tanks, or other bulk storage containers may pose a treat of release as well as unsecured surface disposal areas;

During previous investigations at the site, approximately 174 drums of wood treating sludge, some co-contaminated with asbestos, were located in various locations on the site. In addition, two 160,000 gallon storage tanks containing wood treating sludge and waste water are also located on site in various degrees of deterioration. Two railroad cars, one above ground and one below ground are also located on site and contain wood treating contaminants. Examples of chemicals found in these storage vessels are: Naphthalene 110,000,000 ppb, 150,000 ppb benzene, 23,000,000 ppb dibenzofurans, and 3,300 ppb mercury.

c) The risk of contamination of drinking water supplies exists from the Jennison-Wright site;

Although groundwater is not a focus in the proposed removal action, spills or leaks from the tanks on site can migrate to surrounding soils and groundwater. The source materials being addressed under this removal action contain elevated concentrations of PAH's and in some cases dioxin, furan and PCP, and therefore, potentially pose significant health risks to those using groundwater in the area. Groundwater samples have been taken in association with various investigations on and off site indicating that groundwater is contaminated with both PAH's and PCP. The aquifer underlying the site is part of the "American Bottoms" which is a Mississippi River alluvial aquifer with many users of groundwater in the area.

In addition, the Granite City drinking water treatment plant is located directly to the north of the site, with previous sampling indicating that wind deposition from the site has contributed to contamination on the treatment plant property. It is not known at this time if the treatment plant itself is being affected by loading from the site.

d) High levels of hazardous substances or pollutants or contaminants in soils at or near the surface have the potential to migrate;

The on-site "Jennite" pit or lagoon located in the southeastern portion of the site has been used for the disposal of wastewater and sludge contaminated with creosote, PCP, and dioxins/furans. This lagoon is unsecured with ready access to the public. During warmer months, tar and other substances migrate to the surface and flow off-site, creating an exposure hazard for residents in the area. The Jennite pit is in direct communication with the sand and gravel bearing aquifer beneath the pit. Contamination migration to the aquifer from this pit is likely unless mitigation measures are taken.

The site is virtually completely contaminated on the surface with wood treating constituents, as a result of the now defunct wood treating operation. These areas in association with various pits and lagoons located on and off site all contribute to vertical and horizontal migration of contaminants into the alluvial aquifer beneath the site.

e) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released;

Southern Illinois typically has substantial rainfall in the spring and autumn; freezing temperatures occur during winter. Continuing heavy rains would cause open drums to further deteriorate, and would also promote uncontrolled run-off to occur, allowing for

migration of contamination off-site or into the aquifer beneath the site. During summer months, extreme heat causes the tar associated with the wood treating operations to become fluid, migrating to the surface creating a major contact exposure pathway. The ambient temperature increase also causes the wastes to release volatile and semi-volatile compounds that cause an inhalation exposure risk to residents in the area. PCP and dioxin/furan contamination have been detected beyond the site perimeter due in large part from air born migration of vapors and dust particles.

f) Threat of fire or explosion;

The Jennison-Wright site contains approximately 174 surficial drums. To date the drums have not been sampled to determine their chemical makeup. However, based on existing knowledge of chemical makeup of site wastes, the existence of ignitable wastes does pose a real threat. Constituents such as benzene, and ethylbenzene exist in various sampling results from wastes on and off site. The potential for a fire/explosion exists and if such an event occurs, contaminants could become airborne and may affect the nearby business and residential population.

A preliminary health assessment for the Jennison-Wright site was performed by the Illinois Department of Public Health (IDPH) which indicated that human exposure to PAHs and dioxin/furan could result in carcinogenic risks exceeding the 10^{-4} excess cancer risk level. Health risks were calculated for several exposure pathways including inhalation/ingestion of contaminated dusts and ingestion of contaminated groundwater. Although these assessments are preliminary and may not address all contaminants present at the site, they do indicate that removal of highly-contaminated areas is necessary to ensure protection of human health. To reduce the potential for human exposure, site access must be properly restricted and highly contaminated source materials should be removed to prevent exposure to these materials and eliminate further migration of contaminants from these sources into the environment.

IV. ENDANGERMENT DETERMINATION

Various storage tanks and 55 gallon drums are located on site containing hazardous substances as a result of treating various wood products. These hazardous substances include RCRA Listed Wastes (F027, F032, and F034) containing dioxin/furan levels which exceed the 10^{-4} excess cancer risk level. A number of ground surface areas also contaminated with various wood treating constituents exists causing an direct contact hazard. These areas consist of drainage areas and disposal pits that require access restrictions and covering to mitigate existing hazards.

Given the site conditions, the nature of the hazardous substances on site, and the potential exposure pathways to nearby populations described above, actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response actions selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

V. EXEMPTION FROM STATUTORY LIMITS

A. Consistency Exemption:

In accordance with section 104(c) of CERCLA, the selected removal action will meet the criteria for "consistency and appropriateness" in conformance with future remedial actions at the site. The selected removal action is necessary to avoid foreseeable threats and will prevent further migration of contaminants from specific source areas. The action will conform with USEPA's off-site policy and will utilize alternative treatment or land disposal methodologies where appropriate. The selected removal does not foreclose on future remedial action options and thus will not hinder future remediation anticipated to address soil and/or ground water contamination at the site.

VI. PROPOSED ACTIONS AND ESTIMATED COST

A. Proposed Actions

1. Proposed Action Description

The purpose of this non-time-critical removal action is to mitigate the imminent and substantial threats posed to public health or welfare or the environment from wastes stored and that may have the potential to migrate from the site. The proposed removal action includes the following actions:

- * Installation of a 6-foot chain -link fence around the off-site drainage swale impacted by the soil stockpile at the northeast corner of the site;
- * Characterization of the material within the 174 drums inside the Transite building;
- * Off-site landfilling of 15 drums of asbestos contaminated material contaminated with creosote (assuming no significant dioxin contamination);

- * Removal of creosote waste materials and contaminated soil (including approximately 50 gallons of oil and sludge from oil/water separation; 4,000 gallons of oil/tar from the above ground railcar; 1,500 gallons of oil/sludge from the buried railcar; 8,000 gallons of sludge from the west storage tank; 12,000 gallons of oil from the east storage tank; 55 cubic yards of grossly contaminated soil surrounding the two 160,000-gallon tanks and beneath the railway tank car; 30 cubic yards of contaminated soil in drums; and 800 pounds of spent carbon used for treating wastewater) for incineration at an incinerator permitted to burn dioxin-containing wastes;

- * Incineration of solids and liquids not containing significant levels of dioxin at the Aptus facility (an assumption is made that all materials intended to be incinerated are contaminated with dioxin).

- * Removal of approximately 27,000 gallons of aqueous waste from the buried railcar (10,500 gallons), the east storage tank (12,000 gallons) and drums (2,000 gallons), and wastewater generated during decontamination of tanks (2,500 gallons), on-site treatment by oil/water separation and carbon adsorption, and off-site disposal at the local wastewater treatment plant;

- * Decontamination/dismantling of the storage vessels and railway tank cars and off-site recycling as scrap metal; and

- * Installation of a 6-foot chain link fence around the "Jennite" pit and placement of a temporary cap consisting of clay and an HDPE geomembrane over the pit.

2. Contribution to remedial performance

Implementation of the removal action will be effective in reducing the potential exposure of nearby human populations to hazardous substances and in eliminating the threat of continued release to the environment posed by highly contaminated source materials in storage vessels and the Jennite pit. This action is recommended because it will result in the removal or securing of identified source areas by restricting site access and removing highly contaminated source materials and grossly contaminated exposed soils from the site.

3. Description of alternative technologies

Discussion of various technologies have been addressed in the attached EE/CA.

4. EE/CA

An Engineering Evaluation and Cost Analysis (EE/CA) was conducted by IEPA to evaluate the various options involved in the removal action at the Jennison-Wright site. When determining the best technologies for the site, the EE/CA must consider the criteria of effectiveness, implementability, cost, and public acceptance. A detailed description and discussion of the various options which were considered is contained in the attached EE/CA (see attachment C).

In accordance with CERCLA Section 117, 42 U.S.C. Section 9617, the IEPA held a public comment period from March 30, 1994 through May 18, 1994, to allow interested parties to comment on the EE/CA. The attached responsiveness summary (see attachment D) documented the IEPA's responses to questions, concerns, and comments received during the comment period and during the public hearing. These comments and concerns were evaluated prior to selection of the removal actions for the site.

5. Applicable or relevant and appropriate requirements (ARARs)

Section 300.415 (i) of the NCP states that fund-financed removal actions under CERCLA Section 104 shall, to the extent practicable considering the exigencies of the situation, attain applicable or relevant and appropriate requirement (ARARs) under federal or state environmental or facility-siting laws. Other advisories, criteria, or guidance may be considered for a particular site situation. Specific ARAR discussions may be seen in the attached EE/CA or in attachment F of this memorandum.

6. Project Schedule

Removal activities can be completed in an estimated 30 working days from the time the contractor is mobilized into the field. At this time additional time should not be needed to complete this project.

7. Post Removal Site Control

The State On-Scene Coordinator has begun planning for provisions of post-removal site control, consistent with provisions of Section 300.415(k) of the NCP.

The response actions described in this memorandum directly address actual or threatened releases of hazardous substances, pollutants, or contaminants at the facility which may pose an imminent and substantial endangerment to public health and safety, and to the environment. These response actions do not impose a burden on affected property disproportionate to the extent to which that property contributes to the conditions being addressed.

B. Estimated Costs

Non-responsive



VII. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Delayed action will increase the likelihood of release due to tampering with the drums, tanks, railroad cars or pits containing hazardous substances by trespassers, salvagers, and vandals and / or weather damage. Any such release or exposure will contribute and ultimately lead to increased risks to public health and the environment.

VIII. OUTSTANDING POLICY ISSUES

The Jennison-Wright SACM project is a fully supported State lead project with USEPA as an active member of the SACM team. The Jennison-Wright project is considered to be a "pilot" project by USEPA Region V as far as allowing the State of Illinois to conduct the non-time-critical removal action utilizing State resources.

Since this is a pilot project, additional time for review and sign-off may be necessary by both Agencies upper management prior to beginning work at this site. A cooperative agreement (CA) application has been submitted to USEPA by IEPA to request funding to conduct the removal actions outlined in the EE/CA. Approval of the CA must be granted by USEPA prior to work being conducted on this site.

IX. ENFORCEMENT

Enforcement activities are being designed and implemented by the IEPA and the Illinois Attorney Generals Office. Negotiations with potential PRP's are complete. Settlements appear to be at hand with two (2) of ten (10) PRP's. Funding gained through PRP negotiations will not be sufficient to fund the proposed non-time-critical removal action. Additional information concerning the enforcement strategy for this site is contained in the attached Enforcement Confidential memorandum (see attachment B).

X. RECOMMENDATION

This decision document represents the selected non-time-critical removal action for the Jennison-Wright site, in Granite City, Illinois developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended, and is not inconsistent with the NCP. This decision is based on the Administrative Record for the site.

Conditions at the site meet the NCP section 300.415 (b) (2) criteria for a removal and the CERCLA 104 (c) consistency exemption from the \$2 Million limitation. I recommend your approval of the proposed removal action and \$2 Million exemption. The total project ceiling if approved will be \$2,452,000, of which an estimated \$2,417,000 will be from the Regional removal allowance.

You may indicate your decision by signing below:


Valdas V. Adamkus, Regional Administrator 8/31/94

APPROVE:


Director, Waste Management Division

DATE: 8/11/94

DISAPPROVE:

Director, Waste Management Division

DATE: _____

FIGURES AND ATTACHMENTS:

FIGURE 1.....Site Location (Topographic Map)

FIGURE 2.....Site Features

ATTACHMENT A....Description of Costs

ATTACHMENT B....Confidential Enforcement Memorandum

ATTACHMENT C....Engineering Evaluation/Cost Analysis

ATTACHMENT D....Responsiveness Summary

ATTACHMENT E....Administrative Record Index

ATTACHMENT F....ARARs

cc: T. Johnson, OS-210
Don Henne, Regional Environmental Officer
U.S. Department of the Interior, Room 217
200 Chestnut Street, Philadelphia, PA 19106
B. O'Hara, IEPA, CERCLA Coordinator

bcc: A. Baumann, HSRL-6J
R. Powers/R. Buckley, HSE-5J
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D. Bruce, HSE-5J
L. Fabinski, HSRL-6J
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O. Warnsley, HSM-5J
T. Lesser, P-19J
D. Crume, MF-10J
EERB Read File (M. Johnson)
EERB Delivery Order File (M. Gustafson)
EERB Site File (SF Central File Room)
B. Benning, On-Scene Coordinator, HSE-5J
T. Jacobs, Attorney, ORC, CS-3T
A. Altur, SAM, HSE-5J
D. Ballotti, SACM Coord., HS-6J
C. Brasher, RPM, HSRL-5J
J. Oaks, State Relations, HSMR-5J

Source: USGS, Granite City, IL-MO Quadrangle 7.5 Minute Series, photorevised 1982

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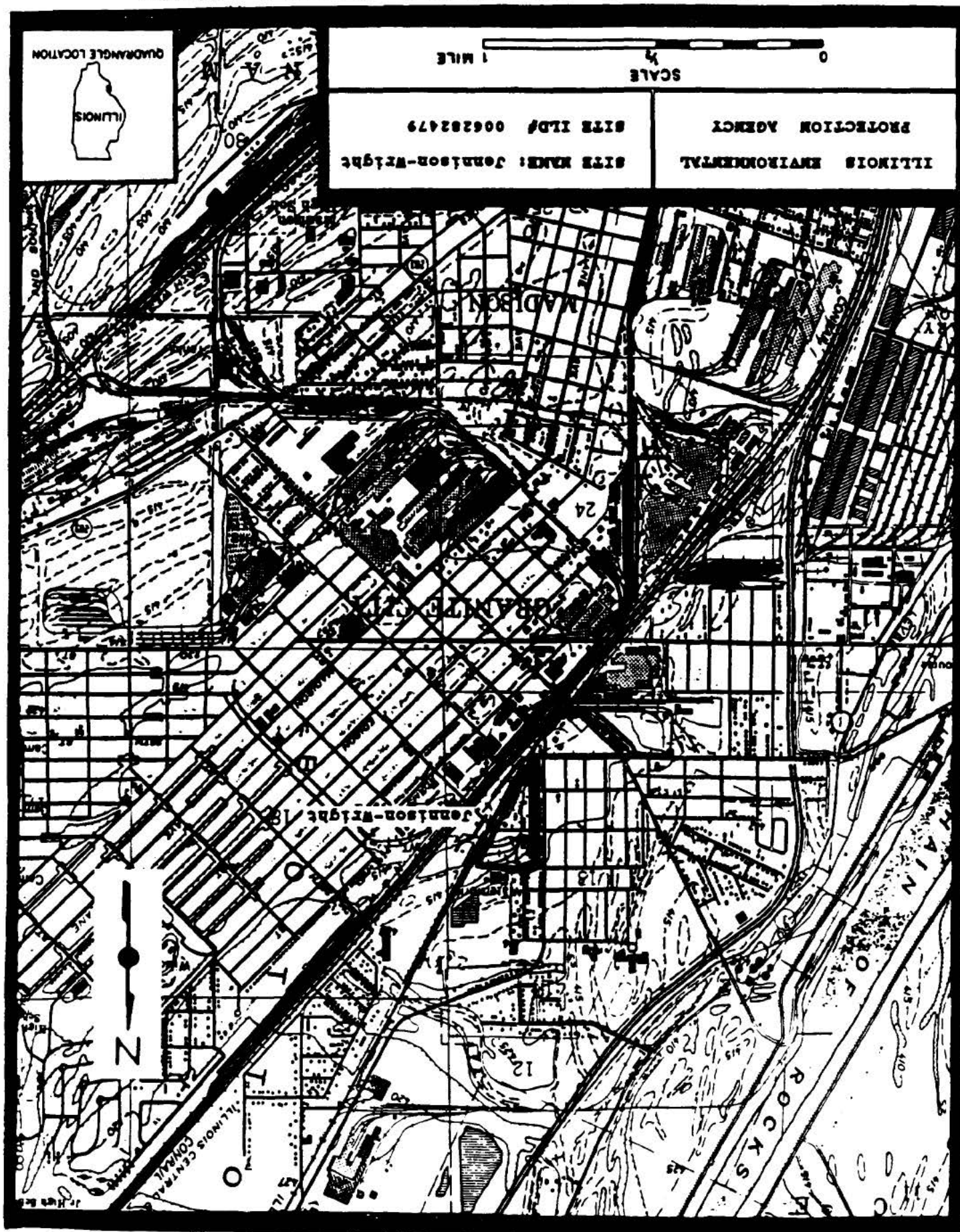


FIGURE 1
TOPOGRAPHIC RELIEF

FIGURE 2

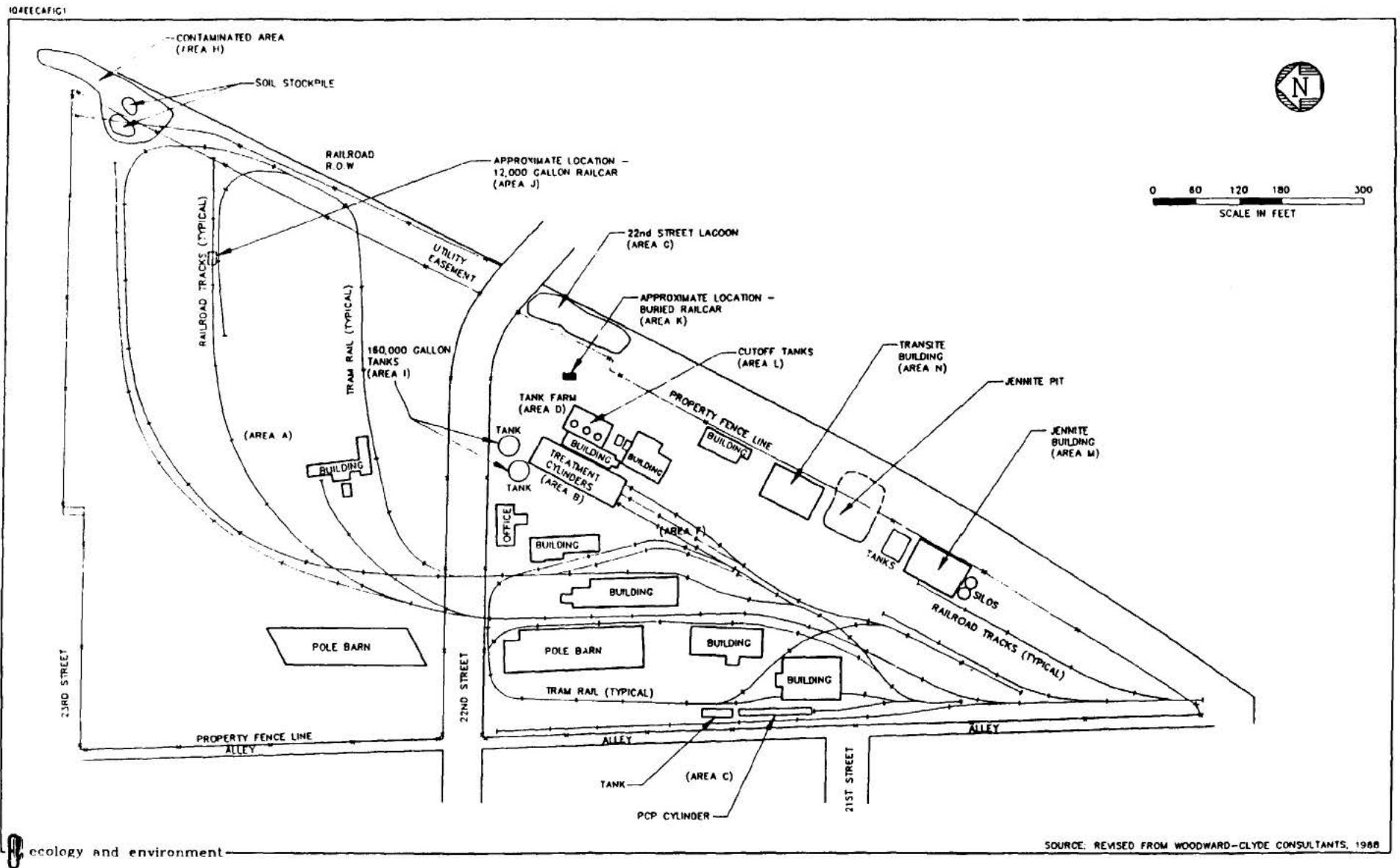
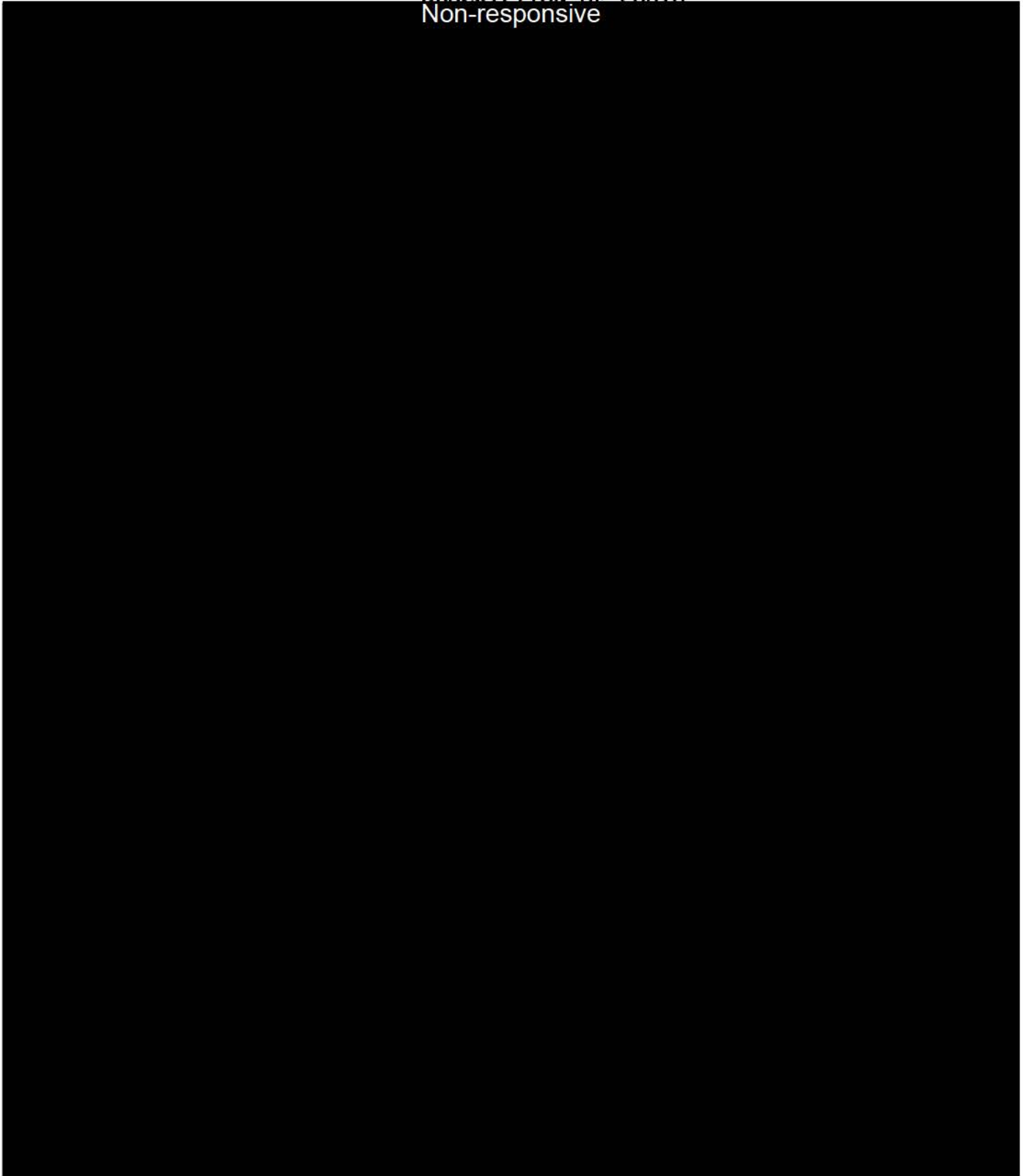


FIGURE 2-2 SITE FEATURES
2-23

ATTACHMENT A
DESCRIPTION OF COSTS
Non-responsive



5 pages redacted
Non-responsive



Illinois
Environmental
Protection Agency

Bureau of Land
2200 Churchill Road
Springfield, IL 62794-9276

June 1994

JENNISON-WRIGHT CORPORATION SITE

Granite City, Illinois

Proposed SACM Removal Action Engineering Evaluation/Cost Analysis

RESPONSIVENESS SUMMARY



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RESPONSIVENESS SUMMARY

Responsiveness Summary Overview

In accordance with CERCLA Section 117, 42 U.S.C. Section 9617, the Illinois Environmental Protection Agency (IEPA) held a public comment period from March 30, 1994, through May 18, 1994, to allow interested parties to comment on the "Engineering Evaluation/Cost Analysis" ("EE/CA"), January 1994. The EE/CA provides a description and discussion of the proposed SACM removal actions at the Jennison-Wright Corporation site.

The purpose of this responsiveness summary is to document the Agency's responses to questions, concerns, and comments received during the comment period and during the public hearing. These comments and concerns were evaluated prior to selection of the SACM removal actions for the site. A complete copy of the EE/CA, Administrative Record, and other pertinent information are available at the Granite City Public Library, 21st and Delmar Streets, Granite City, Illinois (618/452-6238).

Site History

The Jennison-Wright Corporation site occupies a 20-acre triangular piece of property in Granite City, Madison County, Illinois. The site is bisected by 22nd Street, creating a north and south portion. The facility is bordered by the Norfolk-Southern Railroad lines to the east and south; residential areas to the west; and property occupied by the Illinois American Water Company, a residential area, and 23rd Street to the north.

Operations at the facility began prior to 1921 and continued until 1989 with three companies operating at the site. The three companies used various chemicals for wood treatment, including creosote, pentachlorophenol, and zinc naphthanate. Midland Creosoting Company owned the site prior to 1921 and through 1940. The Jennison-Wright Corporation owned it from 1940-1981 and changed their name to J.W. Liquidating. Prior to 1970, J.W. Liquidating constructed an unpermitted lagoon in the southern portion of the property near 22nd Street where creosote contaminated waste water and other waste from the facility were disposed. In 1973, J.W. Liquidating dug a second unpermitted lagoon to dispose of creosote contaminated waste water, waste coal tar pitch and other waste. J.W. Liquidating filled both lagoons with soil and other material without removing the waste. 2-B-J.W. Inc. owned the site from 1981 through 1989 and were authorized to do business as the Jennison-Wright Corporation.

"Jennite", an asphalt sealer product composed of coal tar, pitch, clay and water, was manufactured in the southeastern corner of the facility from the early 1960s to 1986 when Jennison-Wright sold the Jennite process to Neyra Industries. Neyra Industries leased the portion of the facility used by Jennison-Wright for the sealer and continued manufacturing the asphalt sealer until 1989.

Jennison-Wright Corporation filed for Chapter 11 Bankruptcy in November 1989, with an auction held in the fall of 1990 to sell the remaining equipment and materials. The Illinois Environmental Protection Agency (IEPA) sealed the site in November 1990 and the site has remained vacant since that time.

Site Contamination

While in operation, creosote and pentachlorophenol were allowed to spill onto the ground during the wood-treating process located south of 22nd Street. Soil contamination also resulted from creosote dripping from treated ties and blocks during transportation to wood storage areas located north of 22nd Street.

When the site was abandoned in 1989, large quantities of materials and hazardous waste, including above-ground storage tanks and railroad tank cars, were left on site. Years of wood-treating operations have also led to groundwater contamination. Preliminary residential soil sampling also has shown low levels of the same contaminants found on site.

The SACM Program

The proposed removal action is being conducted under the United States Environmental Protection Agency's (U.S.EPA's) SACM (Superfund Accelerated Cleanup Model) program which is designed to speed up actions with minimal environmental investigations at sites which are considered candidates for the National Priorities List (NPL). The NPL is the U.S.EPA's list of most serious, uncontrolled or abandoned hazardous waste sites. IEPA anticipates the site will be proposed for the NPL in 1994.

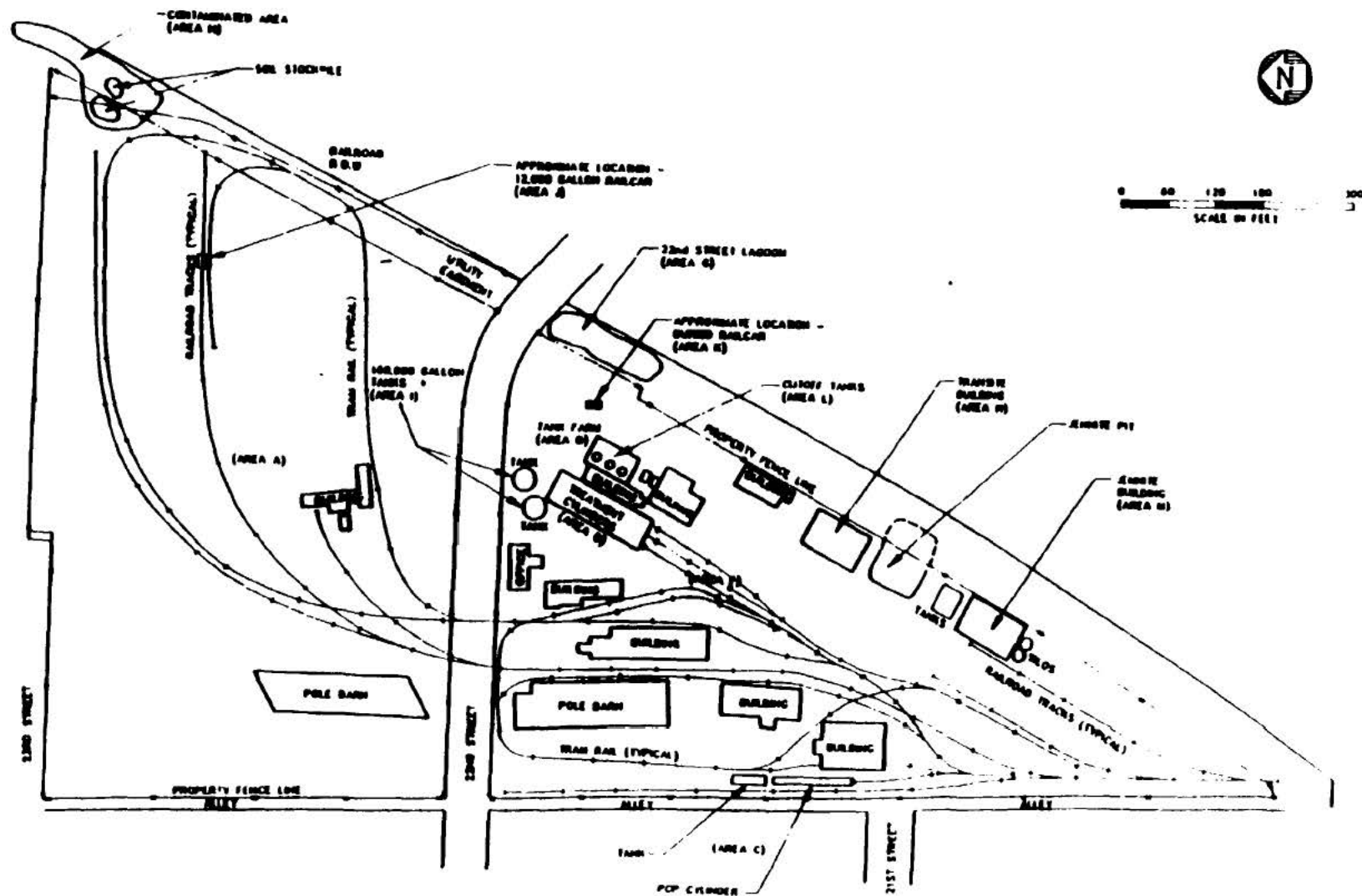
The Removal Action

IEPA must evaluate the various options involved in removal of the hazardous waste at the Jennison-Wright site. (See Site and Source Map.) When determining which are the best technologies for this site, the IEPA must consider the criteria of effectiveness, implementability, cost, and public acceptance. A detailed description and discussion of the various options being considered is contained in the Engineering Evaluation/Cost Analysis (EE/CA).

The SACM actions being considered for this site will include:

- * cleanup, removal, and transportation to an off-site metal recycling facility of two above-ground storage tanks, a buried railroad tank car, and an above-ground railroad tank car;
- * characterization and removal to an off-site incinerator of the material within the 174 drums inside the Transite building;
- * off-site landfilling of 15 drums of asbestos containing material contaminated with creosote;
- * removal and off-site incineration of creosote waste materials and contaminated soil in and surrounding a buried railroad tank car, above-ground railroad car, and two above-ground storage tanks;
- * installation of a chain-link fence around the "Jennite" pit and construction of a clay cover over the pit to reduce seeping of rainwater and limit direct exposure to contaminants;
- * construction of chain-link fence around an off-site property area at the northeast corner of the site.

SITE AND SOURCE MAP



Public Hearing/Public Comments

Prior to the removal action, IEPA was required to hold a minimum 30-day comment period to allow the public to comment on the draft Engineering Evaluation/Cost Analysis (EE/CA). The comment period began on March 30, 1994, and ended on May 18, 1994.

IEPA was also required to conduct a public hearing to receive comments and answer questions on the proposed EE/CA. A notice of the public hearing was published in the Granite City Journal and Granite City Press Record on March 27, April 3, and April 10, 1994. A press release discussing the public hearing and removal action was submitted to the Illinois Information Service (IIS) on April 21st, and a news article discussing the removal action appeared in the Granite City Press Journal on May 5th. The public hearing was held at the Granite City Township Building, 21st and Delmar Streets, on May 3, 1994. Approximately 18 citizens and one local official attended; representatives from the Illinois Attorney General's Office, Illinois Department of Public Health, and United States Environmental Protection Agency were also present.

Agency Responses to Public Questions and Comments

What will the Jennison-Wright property be used for after the removal action?

The site will remain in a similar state until after both the Remedial Investigation/Feasibility Studies have been completed, and a remedial alternative has been chosen and implemented. These studies and further investigations will be conducted once the site is listed on the National Priorities List (NPL).

How long will it take to clean up all of the contamination at the site?

The nature and extent of contamination must be further determined by conducting the Remedial Investigation/ Feasibility Study. Remedial alternatives must be considered and a remedy must be chosen.

Is creosote an animal, vegetable, or mineral product? Is creosote aerobically digestible?

Creosote, which is often used in the wood treating industry and in manufacturing disinfectants and fungicides, is a yellowish to dark green-brown, oily liquid which is derived from either coal or petroleum; both of which are commonly referred to as fossil fuels. Fossil fuels previously originated from living organisms - both animal and vegetable. However, while its origins are both animal and vegetable, creosote is properly classified as a mineral product.

Creosote can be remediated successfully by an aerobic process, that is in the presence of oxygen, as long as the treatment process is properly engineered. Appropriate tests prior to implementing any biological treatment process must be conducted to ensure that the soil and contaminants are compatible.

Will the contamination spread out from the on-site holding tanks?

No. The tanks rest upon concrete pads and are covered with an industrial-weight geotextile (plastic) cover that is designed to resist rainwater, sunlight, and general weathering.

Instead of sending hazardous waste to the incinerator in Coffeerville, Kansas would it be possible to install an on-site, mobile incinerator?

It would not be possible to use a mobile incinerator for this portion of the project. SACM removal actions are short-term, limited cleanups; therefore, a mobile incinerator would not be feasible due to the logistics of time or funding. However, it may be a viable option to be evaluated during the remedial action at this site once it becomes listed on the NPL.

Are there contaminants located off-site -- outside of the fenced area?

Yes; based on limited sampling conducted by Jennison-Wright, USEPA, and IEPA, there appears to be contaminants present off-site that are associated with on-site, wood-treating operations.

Can the \$35 million from U.S.EPA scheduled for the N.L. Taracorp Superfund project be used for this site instead? This money is earmarked for Granite City anyway.

The "lead" regulatory agency for the N.L. Taracorp Superfund site is the USEPA; the IEPA maintains a support role in this project. Therefore, allocation and distribution of the \$35 million is determined by the USEPA - Region V, not the IEPA.

Could the Jennison-Wright site be contaminating the nearby Illinois American Water Company (water treatment plant) or the residential areas?

Based on limited off-site sampling conducted by Jennison-Wright, IEPA, and USEPA, it is difficult to ascertain to what extent contamination has occurred off-site. Future investigations involving groundwater and soil sampling will more adequately determine the extent of contamination resulting from the Jennison-Wright site.

Are the tie carriages and the railroad tracks contaminated? If they are not contaminated, can they be removed by cutting the tracks off or would there be some special treatment necessary?

Yes; the tie carriages and railroad tracks appear to be contaminated with wood-treating compounds. Prior to disposal, all tie carriages and/or railroad tracks must be thoroughly decontaminated prior to disposal or re-use.

What is the date of the 4(q) Notice?

September 16, 1993

The site still is an "eyesore" - with debris, derelict buildings, weeds. Can this be removed from the site?

The debris, derelict buildings, and weeds can be removed under the Superfund process if those items pose an immediate or imminent threat to human health, welfare or the environment. The monies used for Superfund projects can not be utilized to solely improve the visual appearance of a site.

What can be done about the dogs, snakes, rats, and other animals, and children climbing fences to play on the site? Won't additional fences around the site only invite the children to trespass more?

The removal action will include construction of chain-link fences around the "Jennite" pit and around an off-site property area at the northeast corner of the site. Although this may not prevent animals and children from having access to the site, it may discourage direct contact with the contamination on site.

What has caused the delays in clean up of this site?

Although previous site investigations and sampling for scoring of this site were completed in 1988, the new scoring system under the Hazard Ranking System (HRS) was not proposed and finalized until December 14, 1990. Therefore scoring the site under the new HRS was delayed, with additional information being required. The site inspections were completed in July 1991, and the HRS scoring package was prepared and submitted to the USEPA in May 1993. IEPA is currently awaiting USEPA's approval of the scoring package.

In addition, beginning 1990, the State began to experience diminished funding for cleanup and remediation of hazardous waste sites located in Illinois; therefore, IEPA could not undertake this project on its own due to lack of funding. Once the USEPA's SACM Program was initiated in 1992, IEPA began preparation in requesting that the Jennison-Wright site be considered as a candidate for this program.

Could delays in cleaning up this site have caused decreased property values in the community?

According to the Granite City Township Tax Assessor's Office, property values have not decreased in the residential areas near the site. In addition, the tax assessor's office and local loan officers have indicated that there is no evidence of banks refusing to grant home loans for residential properties near hazardous waste sites in Granite City.

Copies of this responsiveness summary were mailed in June 1994 to those who registered at the public hearing and to anyone who requested a copy.

The following items were available for examination and review at the Information Repository:

1. EE/CA
2. Various Fact Sheets
3. IEPA Sample Results (1988, 1990, 1991, 1992)
4. Site Assessments
5. Community Relation Plan
6. Administrative Record

For Further Information

Questions about the hearing process and about access to exhibits should be directed to John Williams, IEPA Hearing Officer, Division of Legal Counsel, IEPA, 2200 Churchill Road, P.O. Box 19276, Springfield, Illinois 62794-9276, or phone at 217/782-5544.

Questions about the Engineering Evaluation/Cost Analysis or proposed removal actions should be directed to Stephen K. Davis, Project Manager, Remedial Project Management Section, Bureau of Land, IEPA, 2200 Churchill Road, P.O. Box 19276, Springfield, Illinois 62794-9276, or phone at 217/782-6760.

Questions about the IEPA's enforcement activities should be directed to Bruce Kugler, Assistant Counsel, Division of Legal Counsel, Bureau of Land, IEPA, 2200 Churchill Road, P.O. Box 19276, Springfield, Illinois 62794-9276, or phone at 217/782-5544.

Questions about the Responsiveness Summary should be directed to Michelle Nickey-Tebrugge, Community Relations Coordinator, IEPA, 2200 Churchill Road, P.O. Box 19276, Springfield, Illinois 62794-9276, or phone at 217/782-6760.


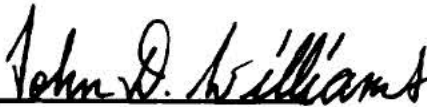
All documents used by IEPA in formulating the SACM removal action for this site are contained in the site Administrative Record (which also contains the EE/CA) at the Granite City Public Library, 21st and Delmar Streets, Granite City, Illinois.

Copies of the transcript of the May 3, 1994, public hearing can be purchased from Jo Elaine Foster & Associates, 618/877-7016.

Additional copies of this responsiveness summary are available from Michelle Nickey-Tebrugge, 217/782-6760.

Thanks to the Citizens Who Became Involved

On behalf of Director Mary A. Gade and the Agency staff, we would like to thank all who took the time to get involved by participating at the public hearing, at other community meetings, and for their questions and comments.

Signed:  Signed: 
IEPA Project Manager Agency Hearing Officer

Signed: 
IEPA Community Relations
Coordinator

Dated: June 27, 1994

Illinois Environmental Protection Agency
2200 Churchill Road
Post Office Box 19276
Springfield, Illinois 62794-9276
Phone: 217/782-6760

GLOSSARY

Asbestos - a building and insulating material widely used for years because of its strength and heat-resisting qualities; it has been found to cause a severe lung ailment, certain types of lung cancer and other respiratory problems.

Aqueous - dissolved in water.

Benzene - a clear, colorless liquid used as a component of gasoline and diesel fuel. It is also used in recent years in the production of chemical compounds and drugs and in the rubber industry. Long-term exposure of benzene may cause damage to the blood-forming system.

CERCLA (*Comprehensive Environmental Response, Compensation and Liability Act*) - a Federal law passed in 1980 and modified in 1986 to create a special tax that goes into a Trust Fund, commonly known as *Superfund*, to investigate and take remedial action at abandoned or uncontrolled hazardous waste sites.

Cleanup - actions taken to deal with a release or threatened release of hazardous substances that could affect public health and/or environment. The term "cleanup" is often used broadly to describe various remedial actions or phases but does not necessarily mean that all hazardous wastes will be completely removed from a site.

Community Relations Plan (CRP) - a plan that is prepared at the start of most Superfund response activities that will allow the community affected by the site to be kept informed of Federal, State, and potentially responsible parties activities. This document is available in the information repository.

Creosote - a brown to black oily liquid obtained from coal tar and used as a wood preservative in railroad ties to extend their useful life. Adverse effects to the skin, lungs, and nervous system may be caused by long-term exposure of creosote.

Dibenzofurans - crystalline solid derived from coal tar sometimes used as an insecticide or industrial solvent.

Dioxins - a generic term for a group of 75 related compounds known as polychlorinated dibenzo-p-dioxins. The most toxic compound of this group is 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). Although scientists disagree on the long-term health effects of exposure to dioxins, they do agree exposure can cause a persistent skin rash called chloroacne.

Drill cuttings - soil or rock chips produced when drilling a well or bore hole.

Engineering Evaluation/Cost Analysis (EE/CA) - performed to evaluate removal actions in terms of their effectiveness, implementability, and cost.

Fluoranthene - a derivative of coal tar and coke oven tars. It is not highly soluble in water but strongly absorbs into soils and sediments. Little information is available on its toxicological effects.

Groundwater - underground water that fills pores in soils or openings in rocks to the point of saturation.

Hazardous Ranking System (HRS) - used by U.S.EPA to decide whether a site should be placed on the National Priorities List (NPL). The score a site receives from the HRS compares the relative hazards for different sites, taking into account the impact the site has on ground water, surface water (e.g. streams and lakes), air, direct contact/soil exposure and nearby populations.

Incineration - high temperature burning of materials to breakdown hazardous compounds.

Jennite - an asphalt sealer product composed of coal tar, pitch, clay and water.

Mercury - a silver-white metal used as a component of pigments, lubrication oils, fungicide, fluorescent light bulbs, thermometers, batteries, and pharmaceuticals. Ingestion of mercury may result in gastrointestinal disturbance and kidney damage. Long-term exposure can result in effects to the brain and central nervous system and the kidney.

Naphthalene - a white, crystalline powder and is produced from either coal tar or petroleum. It is a major component in diesel fuels, fuel oil, and creosote. Naphthalene can cause irritation to the respiratory tract, gastrointestinal system, or skin.

National Priorities List (NPL) - the United States Environmental Protection Agency's list of the most serious, uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action.

Non-aqueous - dissolved in a liquid other than water.

Parts per billion (ppb) - an expression describing a small concentration, equal to an amount of one substance in billion parts of another material; for example, one drop of alcohol in 16 gallons of water.

Pentachlorophenol (PCP) - organic compound consisting of light tan to white, needle-like crystals, primarily used in wood preservation and pesticide. Short-term exposure causes skin, eye, or upper respiratory tract irritation; long-term exposure affects the major organ systems - liver, kidney, nervous, and immune. PCP is tentatively classified as a probable human carcinogen; the classification is based on inadequate human data and sufficient evidence of cancer in animals studies.

Pitch - a thick, dark, sticky substance obtained from the distillation residue of coal tar, wood tar, or petroleum and used for waterproofing, caulking, roofing, and paving.

PRP (Potentially Responsible Party) - any individual(s) or company(s) potentially responsible for, or contributing to, the contamination problems at a hazardous waste site. PRPs can include present and former site owners and operators, as well as anyone who generated or transported the hazardous wastes found at the site. Whenever possible, through administrative and legal actions, IEPA/U.S.EPA requires PRPs to clean up sites they have contaminated.

Purge water - water used to flush a well when taking test samples.

Recycle - process minimizing waste generation by recovering usable products that might be otherwise become waste.

Removal action - short-term immediate actions taken to address releases of hazardous substances that require expedited response.

SACM (Superfund Accelerated Cleanup Model) - a U.S.EPA program designed to speed up actions with minimal environmental investigations at sites which are considered candidates for the National Priorities List.

Seal order - an administrative closure of a property by the Director of the IEPA.

Sludge - a generic term that describes a solid, semi-solid, or liquid waste by-product of an industrial or recycling process.

Solvent - a liquid substance capable of dissolving or dispersing other substance (liquids or solids).

Transite - asbestos siding used in construction of some buildings.

Volatile - readily vaporizable at relatively low temperature.

Zinc naphthanate - chemical used in wood preservation.

1.1
1/1/94

**ENGINEERING EVALUATION/COST ANALYSIS
NON-TIME-CRITICAL REMOVAL ACTION
FOR THE
JENNISON-WRIGHT WOOD-PRESERVING SITE
GRANITE CITY, ILLINOIS**

January 1994

Prepared for :

**ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
2200 Churchill Road
Springfield, Illinois 62794-9276**

**RECEIVED
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EXECUTIVE SUMMARY

This report describes the findings of an Engineering Evaluation/Cost Analysis (EE/CA) for the Jennison-Wright (JW) site, a former wood-treating facility located in Granite City, Illinois. This EE/CA report documents the need to perform a non-time-critical removal action at the site, based on analytical data and observations from preliminary site investigations, and specifies the objectives for the action. The report also describes the evaluation and screening of removal action alternatives to address contaminant source areas at the JW site and recommends a removal action alternative based upon that evaluation.

The JW site encompasses approximately 20 acres in a residential/industrial area at 900 West 22nd Street in Granite City, Illinois. Over the course of operations at the facility, wood was treated on site using three different process solutions: creosote, pentachlorophenol (PCP) solution, and zinc naphthenate solution. In addition, a pavement sealant, "Jennite," was manufactured at the facility using coal tar pitch, a latex/rubber compound, and clay. When wood-treating operations ceased, process equipment and waste materials were abandoned on site.

Process liquids, including residual unused wood-treating solution and spent wood-treating wastes, are present in several storage tanks on the JW site. Contamination (black creosote/tar) is visible in surface soils in many areas of the site, including a waste disposal area at the east boundary of the site and a stockpile of contaminated soil at the northeast corner of the site. Apparently, contamination from the soil stockpile at the northeast corner has migrated off site and along the drainage swale east of the site fence. Analytical results for soil, waste material, and groundwater samples collected at the JW site indicate the presence of semivolatile organic compounds including polynuclear aromatic hydrocarbons (PAHs) and PCP. Chlorinated dioxin and furan compounds have also been detected. Although the site is

surrounded by a chain-link fence, signs of trespassing have been observed on several occasions. In order to address potential health risks posed by human exposure to the contaminants present on site, and to minimize the potential for continued migration of contaminants from source areas, the Illinois Environmental Protection Agency (IEPA) determined that a non-time-critical removal action is necessary and appropriate for specific source areas at the JW site. Although contamination is visible in many areas of the JW site, the removal action is intended to address only those areas that potentially pose the greatest risks to human health and the environment, i.e., areas containing highly concentrated waste materials and/or contamination that has a high potential for migration off site.

IEPA proposes that the removal action address source contamination in the following areas at the JW site:

- Creosote and aqueous wastes in two partially filled 160,000-gallon aboveground tanks;
- Creosote/tar wastes and contaminated soil in a waste disposal area ("Jennite" pit);
- Creosote/tar wastes and contaminated soil previously excavated from the "Jennite" pit, placed in cutoff storage tanks (the tops of which had been removed during salvage activities at the site), and covered with a synthetic geomembrane;
- Aqueous and oily wastes in a buried tank (believed to be a 12,000-gallon railcar);
- 174 drums abandoned on site containing solid and liquid wastes;
- Oil/tar in a 12,000-gallon railcar at the north end of the site; and
- Contaminated soil stockpiled at the northeast corner of the site and adjacent off-site drainage swale impacted by runoff from the stockpile.

A range of removal action options was evaluated for each of the areas listed above. Treatment, containment, and disposal options and technologies were identified that would be appropriate to address the contaminated media at the site. Options were screened using the criteria of effectiveness, implementability, and cost. Those options that were determined to be feasible were combined into alternatives for each of five media: contaminated soils, aqueous wastes, oil/creosote wastes, the metal tanks themselves, and the "Jennite" pit. Each

removal action alternative was analyzed with respect to the same three evaluation criteria utilized to screen technology options: effectiveness, implementability, and cost. Included in this evaluation was an assessment of how well the alternative would protect human health and the environment.

For grossly contaminated soils, including soil stored in drums, soil surrounding the storage tanks, excavated soil in the cutoff tanks, and stockpiled soil in the northeast corner of the JW site, four alternatives were evaluated: fencing and capping, excavation and landfilling, excavation and incineration, and excavation and dechlorination followed by fuels blending. While fencing was deemed appropriate for the soil stockpile at the northeast corner of the site and adjacent impacted off-site areas, fencing and capping were not appropriate for soil stored in drums or the cutoff tanks. Fencing and capping are not recommended for the soils surrounding the storage tanks because such containment would not be consistent with future investigation and remediation activities. The presence of dioxins would restrict landfilling of contaminated soils. Dechlorination would require treatability testing to ensure that the process would be technically effective and cost-effective and thus would delay the removal action. Therefore, excavation of soil surrounding the storage tanks and incineration of these soils along with soil currently stored in drums and in the cutoff tanks, which would provide permanent treatment for the contaminated soils, is recommended. However, the cost to incinerate the volume of soil stored in the cutoff tanks would significantly increase the cost of the removal action, resulting in an action that would greatly exceed the \$2,000,000 limit typically applied to fund-financed removal actions. Therefore, unless sufficient funding is available, it is recommended that the soil continue to be stored on site in the cutoff tanks until a comprehensive remedial action is implemented to address remaining contaminated soils at the site. The cutoff tanks appear to be fairly secure at this time.

Two alternatives were evaluated for aqueous wastes in the storage tanks and drums. Each included two on-site pretreatment steps: oil/water separation and carbon adsorption treatment. Under one alternative, pretreated water would be transported to a wastewater treatment plant. Under the other alternative, pretreated water would be discharged directly to the sewer system. The pretreatment steps would be effective in meeting pretreatment standards established by the wastewater treatment plant. Direct discharge to the sewer system would be slightly less costly and slightly more implementable while providing the same level of effectiveness.

The three alternatives that were evaluated for the oil and creosote wastes currently stored in tanks and drums included incineration, dechlorination followed by fuels blending, and recycling/reuse. Again, dechlorination would require treatability testing because its effectiveness is uncertain. A facility willing to accept the materials for recycling/reuse has not been identified to date. Therefore, incineration is recommended.

Alternatives that were evaluated for the abandoned tanks, once they have been emptied, included decontamination and dismantling, followed by either disposal or recycling as scrap. Recycling is the preferred alternative and is less costly.

The three alternatives that were evaluated for the "Jennite" pit included fencing and capping, excavation and incineration, and excavation with dechlorination followed by fuels blending. Excavation and incineration of the materials in the pit would be cost-prohibitive. The feasibility of dechlorination is uncertain. Therefore, fencing and capping, which would limit the potential for human exposure to contaminants, is recommended.

Based on a comparative analysis of the removal action alternatives developed for the JW site, the following removal action is recommended:

- Installation of fencing around the off-site drainage swale impacted by contamination from the soil stockpile at the northeast corner of the site;
- Characterization of the material within the approximately 174 drums currently stored inside an on-site building, to determine appropriate disposal for the material;
- Off-site landfilling of 15 drums of asbestos-containing material (ACM) contaminated with creosote;
- Removal of approximately 25,550 gallons of creosote, sludge, and oil waste materials currently stored in abandoned tanks on site and 85 cubic yards of contaminated soil surrounding storage tanks and stored in drums for off-site incineration;
- Removal of approximately 27,000 gallons of aqueous waste (from the buried railcar, the east storage tank, and drums) and 2,500 gallons of wastewater generated during decontamination of tanks; on-site treatment by oil/water separation and carbon adsorption; and off-site disposal at the local wastewater treatment plant;
- Decontamination/dismantling of the storage vessels and railway tank cars and off-site recycling as scrap metal; and

- Installation of a 6-foot chain-link fence around the "Jennite" pit and placement of a temporary cap consisting of clay and a high density polyethylene (HDPE) geomembrane over the pit.

The estimated total cost to implement the removal action is \$2,010,000.

Implementation of this removal action would be effective in reducing the potential exposure of nearby human populations to hazardous substances and in eliminating the threat of continued release posed by highly contaminated source materials in storage vessels and the "Jennite" pit. This action is recommended because it will result in the removal or securing of the source areas that have been identified, by restricting site access and removing highly contaminated source materials and grossly contaminated exposed soils from the site, and therefore will be protective of human health and the environment.

Another optional removal action is also recommended, in the event that additional funding is available beyond the \$2,000,000 limit typically placed on fund-financed, non-time-critical removal actions. The optional action would be similar to the action described above, with the exception that the 140 cubic yards of contaminated soil contained in the cutoff tanks would also be removed from the site and incinerated. The cutoff tanks would be decontaminated, dismantled, and recycled as scrap. Although these tanks are covered and appear to be fairly secure at this time, this soil will eventually need to be addressed. Under this revised removal action approach, the total estimated cost would be \$3,290,000.

A third option for the removal action would consist of recycling oil stored in the east 160,000-gallon storage tank at an active wood-treating facility instead of incinerating it. Efforts to date to identify a facility willing to accept this material have been unsuccessful; however, further efforts may identify such a facility and thereby reduce the removal action cost by up to \$300,000.

1. INTRODUCTION

The purpose of this engineering evaluation/cost analysis (EE/CA) is to screen and evaluate removal action alternatives for six areas at the Jennison-Wright (JW) site in Granite City, Illinois. Contamination at the JW site is the result of almost 90 years of wood treatment with creosote, pentachlorophenol, and zinc naphthenate. Investigations conducted by the Illinois Environmental Protection Agency (IEPA), Ecology and Environment, Inc. (E & E), and Woodward-Clyde Consultants (WCC) have revealed significant concentrations of creosote and polynuclear aromatic hydrocarbons (PAHs) in an on-site disposal area, on the surface soils, and in storage tanks abandoned on site. In addition, wastes have previously migrated off site and required temporary stabilization. Because the site poses a threat to public health and the environment, IEPA has determined that a removal action in accordance with criteria set forth in Section 300.415 (b)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), is necessary to reduce the threat.

An EE/CA is required for all non-time-critical removal actions, pursuant to Section 300.415 (b)(4) of the NCP. To expedite cleanup and increase efficiency in the Superfund process, the Superfund Accelerated Cleanup Model (SACM), has been created within the framework of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the NCP. An EE/CA provides a comparative analysis of removal action options for a Superfund hazardous waste site. It should satisfy four goals:

1. Provide a methodology for the evaluation and the selection of a removal action alternative that employs a sound and appropriate technology for the specific site;
2. Fulfill the requirements of the National Environmental Policy Act (NEPA) for non-time-critical removal actions;

3. Provide improved documentation for removal action selection to facilitate cost-recovery efforts; and
4. Provide organized documentation of the decision-making process for any removal action for inclusion in the Administrative Record.

This EE/CA evaluates removal action alternatives for the site, describes recommended removal action alternatives, and explains the rationale for the recommendations. Background information on the site is presented in this EE/CA and in the references.

2. SITE CHARACTERIZATION

2.1 SITE DESCRIPTION AND BACKGROUND

2.1.1 Site Location

The Jennison-Wright facility is located at 900 West 22nd Street in Granite City, Illinois. The site is approximately 1 mile east of the Chain of Rock Canal, which flows into the Mississippi River. More precisely, the site is in the NE 1/4, SE 1/4, Section 13, T3N, R10W, of Madison County, Illinois. Figure 2-1 shows the site location.

The site is adjacent to the Granite City Manufacturing Belt Railway in a mixed residential-industrial neighborhood. It is bisected by 22nd Street with wood storage areas located north and facility process areas located south of the street (IEPA 1984).

2.1.2 Site Background

The Jennison-Wright site is a defunct wood preserving facility that treated railroad ties and wood block flooring from the early 1900s until 1989. The facility treated wood products using both creosote and pentachlorophenol (PCP). Later the PCP operation was changed to zinc naphthenate. In addition, a driveway sealer, "Jennite," was produced at the facility. A site map of the facility showing the treatment and the storage areas is presented in Figure 2-2 (IEPA 1983; E & E 1985).

Two different processes were employed at the facility to treat wood and wood products. The oldest process used creosote as the preserving agent. The creosote process has been in operation since the early 1900s. The process equipment included three treating cylinders; each were 6-feet in diameter with lengths of 136, 96, and 113 feet. In addition, there were three 28,000-gallon capacity creosote working tanks; various steam pumps; a compressor; a vacuum pump; and miscellaneous storage tanks. The treating cylinders were

located adjacent to one another in an unlined, 150- by 45- by 3-foot depression. These cylinders were originally located within a building until 1975, when the building was destroyed by fire (IEPA 1983).

The process involved pumping heated creosote (200°F) into a treating cylinder that was filled with either railroad ties or wood blocks. Heat and pressure were applied to railroad ties from three to four and one-half hours. Blocks were heated, only, for approximately one-half hour. Creosote was then pumped back to the work tanks. A vacuum was applied to remove excess creosote, which was then blown back to the work tank (E & E 1985).

At the conclusion of the treatment process, the cylinder door was opened, allowing residual creosote at the bottom of the cylinder to spill out onto the ground. Two in-ground cisterns were located at the rear of the cylinders. These cisterns collected creosote and surface water runoff that accumulated in the pit. Steam pipes were placed throughout the pit area to heat spilled creosote and increase the flow of creosote into the cisterns. The contents of the cisterns were then pumped into an above-ground creosote/water separator. Recovered creosote was returned to the work tanks (or a storage tank) and the water was discharged to the municipal sewer system. Creosote was used at an average rate of 805,000 gallons per year, although this quantity fluctuated significantly depending on demand (E & E 1985). As the creosote in the work tank was used, make-up creosote was added from two 160,000-gallons tanks located north of the cylinders.

Wood ties and blocks were transported before and after treatment in small gauge trams. The rails for the tramway were situated throughout the facility, primarily between the sawmills, the treating cylinders, and the storage yard. Soil contamination resulted from creosote dripping from treated ties and blocks during transportation to storage areas (E & E 1985).

The creosote process also included an in-ground oil/water separator. This separator was an unlined 10-foot by 16-foot pit of indeterminate depth. Steam from the heating coils located in the creosote work tanks, the boiler blowdown, and the vacuum pump cooling water discharged into this pit through baffled compartments, and then into the municipal sewer. Occasionally, the steam heating coils in the creosote work tanks developed a leak and aspirated creosote. When this creosote-contaminated steam discharged to the in-ground separator, the creosote settled to the bottom of the pit (E & E 1985).

In 1987, retooling and modernization of the creosote treating area occurred in which the old riveted-seam creosote treatment cylinders were removed and replaced with modern welded-seam cylinders. The replacement involved the removal of both the cylinders and associated foundations, the cisterns located in the cylinder area, and contaminated soil. In the vicinity of the cisterns, soil was excavated to a depth several feet below the ground surface. A concrete containment structure was constructed in the excavation, followed by the installation of the new cylinders. A new tank farm was constructed within a concrete containment structure and the previously-used tanks were demolished. All contaminated soils removed from the excavation were disposed of off site as hazardous waste at the Peoria Disposal Company Landfill in Peoria, Illinois (WCC 1988). The replacement of the creosote treating area was performed without IEPA approval. Some visibly contaminated soils remained in the excavation and were covered with concrete. Areas of contaminated soil that were covered with concrete will be included in the facility's Remedial Investigation/Feasibility Study (RI/FS).

The pentachlorophenol (PCP) process operated from 1974 until 1986. Decorative wood blocks for flooring were treated with a preservative made up of a light petroleum distillate base and 5% PCP. Process equipment included a 17,000-gallon treating cylinder, a 15,000-gallon working storage tank, a storage tank, a compressor and a vacuum pump. The process involved placing wood blocks (carried on trams similar to those used in the creosote process) into the treating cylinder, which was then filled with the PCP solution. Once the cylinder was full, PCP solution was forced back into the working storage tank by pressurizing the cylinder with 100 psi of air. A 24-inch Hg (mercury) vacuum was applied to the cylinder for two and one-half hours to draw out excess PCP solution. Air pressure was again applied to clean out the remaining PCP solution. At the conclusion of the treatment process, the cylinder door was opened allowing the residual PCP solution at the bottom of the cylinder to spill out onto the ground (E & E 1985; WCC 1988).

The treating cylinder and storage tanks were located approximately 30 feet from the west boundary of the plant. PCP solution was used at an average rate of 15,000 gallons per year, although this quantity fluctuated significantly depending on industry demand (E & E 1985).

In 1986, the PCP process was replaced with a zinc naphthenate process. The equipment and the area used for the zinc naphthenate process has remained unchanged from that used in the PCP process (WCC 1988).

In 1989, JW declared bankruptcy, and wood treatment operations at the site ceased. In 1990, JW closed and equipment was salvaged. At this time, all of the treatment cylinders and some of the tanks were removed. Also, some of the rails were removed.

In addition to the wood treatment, Jennite was produced at the site. Jennite is a coal tar pitch product used commercially as a pavement sealant. The basic components are clay, coal tar pitch, and a latex/rubber compound. The product was manufactured at the Jennison-Wright wood treatment facility beginning in the early 1960s (E & E 1985).

The process involved two 35-foot-tall storage silos, assorted mixing chambers, and an emulsion process that utilizes three heated tanks. Coal tar pitch and a latex/rubber compound were cooked at 259°F to form an emulsion base. This base was mixed with the clay to make Jennite, which was then packaged and stored in 55-gallon steel drums (E & E 1985). The Jennite product was also packaged in 5-gallon containers for retail sale. In 1989, the Jennite operations ceased.

2.1.3 Surface Features and Topography

The site is approximately 20 acres in size and triangular in shape. The site topography is relatively flat, varying in elevation by only 2 to 3 feet. Surface drainage in areas north of 22nd Street appears to be toward the northeast corner of the site, where it is channelled northward along the railroad tracks. Surface drainage south of 22nd Street appears to be radially away from the site along the perimeter. Toward the center of the site, surface water runoff appears to flow to lower areas, such as the creosote treatment cylinder area or to the zinc naphthenate area (PCP area) (WCC 1988).

Major portions of the site are unvegetated and have residual tar and drippings from the treatment processes.

2.1.4 Geology and Soils Information

According to the State Geological Survey Report of Investigations 191, the Jennison-Wright site is located in an area often referred to as the American Bottoms. The Mississippi River currently occupies a deep bedrock valley that had been filled with both glacial outwash

material and recent alluvium. The thickness of the valley fill is generally greater than 100 feet. In the Granite City area the thickness is about 115 feet. The stratigraphy of the valley fill consists primarily of silts and clays with some fine sand (recent alluvium) with a thickness ranging from 15 to 30 feet below the ground surface. Below this depth, the deposits vary from poorly graded to well graded sands and gravels. Underlying these soils are typically coarser sands and gravels that extend to bedrock. The bedrock in the area consists of Mississippian and Pennsylvanian limestones and dolomites with lesser amounts of sandstone and shale (WCC 1988).

According to Circular 168 from the State of Illinois Department of Energy and Natural Resources, major supplies of groundwater are withdrawn from the valley fill material. Groundwater in the valley fill deposits occurs under watertable (unconfined) conditions. The water table is generally found in depths ranging from 15 to 20 feet below the ground surface. Groundwater flow is primarily towards the Mississippi River, except in areas of high pumpage and large depressions in the water table. The bedrock in this area is considered a poor source of water primarily due to its low permeabilities and poor water quality (WCC 1988).

Sixty-two water wells have been identified within a 1-mile radius of the Jennison-Wright facility. Most of the wells were completed in valley fill. The primary user of groundwater in the Granite City area is industry. According to Granite City water department personnel, some domestic wells do exist but are used primarily for watering lawns and shrubs, and not for drinking water. Some domestic wells, however, may be used for drinking water and vegetable gardens. Granite City currently uses the Mississippi River as a source of drinking water. The Granite City intake is upgradient of the Jennison-Wright facility near the I-270 bridge across the Mississippi River (WCC 1988).

Two wells are located on the adjacent Nestlé property east of the JW facility. These wells are located on Nestlé's western property line. One well is used to supplement Nestlé's sprinkler system. The other is used as process water in a non-contact capacity. This latter well is in continuous use and withdraws 250 gallons per minute. A third well is located on the eastern side of the Nestlé property and is only used when the process water well is out of service. All these wells are 113 to 117 feet deep and have 30- to 35-foot screens (WCC 1988).

2.1.5 Surrounding Land Use and Population

The land use around the Jennison-Wright site is a mix of residential and industrial. Private dwellings, which have private wells, are located adjacent to the site along the west and a portion of the northern boundary. To the north, the site borders the Granite City water works. A railroad forms the southeast boundary of the site. Across the tracks is an industrial area, including a Nestlé Tea plant.

2.1.6 Meteorology

Granite City is located at the confluence of the Missouri and Mississippi Rivers, near the geographical center of the United States. The area has a modified continental climate and is able to enjoy the changes of a four-season climate without prolonged periods of extreme heat or high humidity. To the south is the warm, moist air of the Gulf of Mexico, and to the north, in Canada, is a region of cold air masses. The alternate invasion by air masses from these sources, and the conflict along the frontal zones where they come together, produce a variety of weather conditions (Ruffner et al. 1985).

Winters are brisk and last for long periods, but are seldom severe. Records since 1870 show that temperatures drop to zero or below on an average of two or three days per year. Temperatures remain as cold as 32 degrees or lower less than 25 days in most years. Table 2-1 shows the average maximum and minimum daily temperatures, precipitations and wind speeds for the area. Snowfall has averaged a little over 18 inches per winter season. Snowfall of an inch or more is received on five to ten days in most years (Ruffner et al. 1985).

The long-term record for Saint Louis, the nearest weather station, indicates that temperatures of 90 degrees or higher occur on about 35-40 days a year. Extremely hot days of 100 degrees or more are expected on no more than five days per year.

Normal annual precipitation for the areas is a little less than 24 inches. The three winter months are the driest, with an average total of about 6 inches of precipitation. The spring months of March through May are normally the wettest with normal total precipitation of just under 10-1/2 inches. It is not unusual to have extended dry periods of one to two weeks during the growing season (Ruffner, et al., 1985).

2.2 PREVIOUS STABILIZATION EFFORTS

On May 4, 1992, Riedel Environmental Services (RES) and their subcontractor Environmental Operation, Inc. (EO) performed a stabilization at the JW site. During this effort, EO removed 22 cubic yards of asbestos containing material (ACM), and containerized an additional fifteen 55-gallon drums of asbestos containing material that was contaminated with creosote. These drums, along with 121 other drums found on site, were moved to the "Transite" building on site. Additional work performed at the site included:

- Pumping of approximately 1,300 gallons of cresol contaminated water to the west 160,000-gallon aboveground storage tank;
- Removal of 20 yards of cresol contaminated soil to the three cutoff working tanks;
- Covering of those tanks with a membrane liner;
- Erecting a fence near the "Jennite" pit; and
- Securing the "Transite" building.

Although RES claims to have moved only 20 cubic yards, the volume of soil in the working tanks is estimated to be 140 cubic yards. There is no explanation for this difference in volume.

The uncontaminated ACM was removed from several piles within the site, and was properly sprayed and double-bagged prior to being placed into a lined 40-cubic-yard secure container. After completion of the removal, the container was transported to the Litchfield/Hillsboro Landfill for land disposal. The contaminated ACM was sprayed and double-bagged prior to being placed into 55-gallon drums that were later moved to the "Transite" building.

RES moved one hundred twenty-one 55-gallon drums that were located throughout the site to the "Transite" building. One hundred and eight drums were found in two concrete pits. In addition, ten drums were found on the west side on the property, and 3 drums were found southwest of the "Transite" building. RES performed an inventory of the drums, and the following is a summary of that inventory:

- 121 drums found around the site (as described above);
- 15 drums of ACM contaminated with cresol; and

- 38 drums found inside the "Transite" building.

After the drums were secured, RES transferred 1,300 gallons of creosote-contaminated water from the open work tanks and associated containment areas to the east 160,000-gallon aboveground tank.

During the stabilization, creosote and tar were noted migrating from the "Jennite" pit along the eastern site boundary. A portion of the site fence along the east side of the pit was removed, and creosote, tar, and contaminated soil east of the fence were removed and placed into the cut off work tanks. Wooden covers were constructed for these tanks, which were in turn covered with 40 mil high density polyethylene (HDPE) geomembrane fixed in place with steel banding. The tanks appear to be well secured at this time. The eastern portion of the pit was covered with mont merionite, a clay material still stored at the site that had been used in the production of Jennite, and a temporary mont merionite berm was constructed along the east side of the pit. After this work was completed, the fence was replaced (RES 1992).

2.3 SOURCE, NATURE, AND EXTENT OF CONTAMINATION

IEPA has collected samples for laboratory analysis from most of the source areas that are intended to be addressed under this action. Samples were analyzed for volatile organic compounds (VOCs), PAHs, metals, and dioxins/furans. Analytical results are summarized in Tables 2-2 (VOCs, PAHs, and metals) and 2-3 (dioxins/furans).

2.3.1 Waste Quantity

160,000-Gallon Tanks

Two 160,000-gallon aboveground tanks are located in the southern portion of the site near 22nd Street. These tanks were used to store unused creosote. One of these tanks (west) now has a 2-foot diameter hole cut into the side and presently contains creosote and residuals from previous stabilization efforts. This tank contains approximately 8,000 gallons of thick sludge. The east tank contains approximately 12,000 gallons of water and 12,000 gallons of creosote oil. Summaries of the chemical analyses performed on samples from these tanks are shown in Tables 2-2 and 2-3. In addition to the liquid in the tanks, there is visible contamination around the tanks from spillage. It may be appropriate to remove this contaminated soil when the tanks are removed.

"Jennite" Pit

The on-site sludge disposal pit, located at the eastern property boundary near the Jennite process, is approximately 15 to 20 feet deep and contains between 2,700 and 3,600 cubic yards of waste. Creosote and Jennite process wastes have been disposed of in what is referred to as the "Jennite" pit. The previous stabilization removed creosote and tar that migrated off site. Tables 2-2 and 2-3 provide analytical results for samples collected from this pit.

Tar, "Jennite," and/or creosote can be observed, mixed with soil, at the surface of the pit. This black material becomes less viscous, and therefore flows more readily, in warmer weather. Animal carcasses have been discovered stuck in the pit. The material in the pit should be removed, or at a minimum isolated and contained, to restrict access and minimize the potential for exposure to the tar or other contaminants in this area.

Cutoff Tanks

During an earlier stabilization of the "Jennite" pit, approximately 140 cubic yards of creosote, contaminated soil, and sludge were removed from the area and placed into the former working tanks in the creosote treatment area. The tops of the tanks had been previously removed by salvaging operations conducted during bankruptcy proceedings. Wooden covers and membrane liners were placed over the tanks to eliminate water accumulation and to keep dust from being blown out of the tanks. This work is discussed in Section 2.2. The creosote, contaminated soil, and sludge (140 cubic yards) in the tanks should be removed, and the tanks should then be properly cleaned and released as scrap steel.

Buried 12,000-Gallon Tank Car

Northwest of the treatment tanks is a buried 12,000-gallon railcar. It appears that the tank car was used for storage of PCP liquids. The tank car currently is full of black oil and sludge (1,500 gallons), and water (10,500 gallons). This tank is in the general vicinity of the oil/water separator. A summary of the analytical results for samples collected from this tank is shown in Tables 2-2 and 2-3. In addition to the tank, any contaminated soil from spills and/or leaks should be removed.

Stored Drums

To the south of the creosote treatment building and cylinders is a building that contains approximately 174 drums. The drums contain asbestos contaminated with creosote and drill cuttings and water from the installation of monitoring wells. This building is referred to as the "Transite Building," because of the type siding used for its construction. Fifteen of these drums contain asbestos contaminated with creosote. The remaining drums are unknown, but are believed to be investigation-derived waste from past sampling episodes and drill cuttings and purge water from well installation. Some of these drums may also contain waste from site operation. For cost-estimating purposes it has been assumed that 119 drums contain solids/soil and 40 drums contain primarily aqueous waste. Field screening and/or sampling of these drums will be required for disposal.

12,000-Gallon Railroad Tank Car

A 12,000-gallon railcar is located on one of the tracks in the drip yard on the northern portion of the site. It is unclear how this railcar was used, but approximately 4,000 gallons of black to dark brown liquid and sludge are now stored in the tank. A summary of the analytical results for samples collected from this tank is given in Tables 2-2 and 2-3. A small amount of spillage has occurred. It may be appropriate to remove visible contamination when the railcar is emptied and removed.

Northeast Soil Contamination

In the extreme northeast corner of the site, tar and contaminated soil have been observed. It appears that this material may have been stockpiled outside of the fence along the drainage feature below the railroad tracks. Table 2-2 provides a summary of analytical results from a sample collected from this soil.

2.3.2 Release of Contaminants

Contamination has been observed around the aboveground storage tanks and the railroad tank car, all of which presently contain liquids. This contamination is almost exclusively creosote. Soil sampling in these areas revealed only PAH compounds. Pentachlorophenol was detected only in the buried 12,000-gallon tank. Soil samples around this tank have not been collected, because the orientation of the tank is unknown. It is assumed that

PCP will be found in this area if contaminated soil is found. Dioxins/furans were detected in samples from the tanks and the Jennite pit and may be present in surrounding soils. A release of creosote and coal tar has been observed from the "Jennite" pit. This release is discussed in Section 2.2.

2.3.3 Nature and Extent of Contamination

Creosote, used in wood preservation, is a distillate derived from coal tar. Creosote is a mixture of aromatic hydrocarbons containing up to 5% each of tar acids and bases. It contains a large number of chemical constituents (over 300). The actual constituents are highly variable, depending on the source of the coal, the design of the system, and the operating conditions. Hydrocarbons present include fluorene, anthracene, phenanthrene, and naphthalene. The tar acids are mainly phenols, cresols, xylenols, and naphthols; the tar bases consist of pyridines, quinolines, and acridines.

Waste contained in the tanks consists of liquid creosote and creosote-contaminated water. Also, PCP has been detected in the waste in the buried 12,000-gallon tank. Soil contamination around these tanks consists of spillage/leakage from the tanks. Waste creosote from the wood treatment process and coal tar from the "Jennite" production are the contaminants found in the "Jennite" pit. Soil contamination in the northeast portion of this site is from spillage and dripping of creosote and site runoff.

The extent of contamination at this site has not been determined. An RI/FS is planned for some time after this removal. Although other areas of contamination have been identified at the JW site, the removal action associated with this EE/CA will focus on addressing only those significant sources identified in this report that have the potential to continue to release contamination to the environment.

2.3.4 Site Impact on Public Health or Welfare or the Environment

Exposure to humans and other organisms to creosote and coal tar may occur by direct contact (skin absorption), inhalation, or ingestion. Few studies of human exposure to creosote have been performed. Those that have been conducted focused mainly on beechwood creosote, which does not contain many of the PAH compound associated with coal tar creosote. Most information on creosote is either anecdotal or based on animal studies.

There is little or no information on the inhalation exposure route. Cancers of the nasal cavity, larynx, lung, skin and scrotum have been associated with exposure to creosote. Mutagenic PAHs are a component of creosote and have been linked to the development of myeloma (Fraumeni 1975).

Coal tar creosote exerts its toxic effect primarily via dermal exposure. Irritation, burns, and "warts" have been reported following acute or prolonged skin contact. Phototoxicity and skin carcinogenicity have been demonstrated in animals. NIOSH has established a permissible exposure limit (PEL) of 0.1 mg/m^3 for coal tar products.

Because creosote contains PAH compounds, the health effects of PAHs also relate to creosote. The major health concern associated with PAHs is that the majority are suspected or known human and animal carcinogens. Benzo(a)pyrene is considered to be the most carcinogenic (Sittig 1985; DHHS 1985). No other exposure effects are noted. PAH compounds are taken up in the body and stored in fat, kidneys, liver, and, to a lesser extent, by the spleen, adrenal glands, and ovaries. In 1970, the World Health Organization (WHO) recommended a concentration of $0.2 \text{ } \mu\text{g/L}$ for total PAH compounds in drinking water. There are no final EPA drinking water Maximum Contaminant Level (MCL) for PAHs. The following table lists the current proposed MCLs (EPA 1991).

<u>Compound</u>	<u>Proposed MCL</u>
Benzo(a)anthracene	$0.1 \text{ } \mu\text{g/L}$
Benzo(a)pyrene	$0.2 \text{ } \mu\text{g/L}$
Benzo(b)fluoranthene	$0.2 \text{ } \mu\text{g/L}$
Benzo(k)fluoranthene	$0.2 \text{ } \mu\text{g/L}$
Dibenzo(a,h)anthracene	$0.3 \text{ } \mu\text{g/L}$
Indeno(1,2,3-cd)pyrene	$0.4 \text{ } \mu\text{g/L}$

The 1×10^{-6} cancer risk level for PAHs in drinking water is $0.028 \text{ } \mu\text{g/L}$ (Sittig 1985). The only established aquatic Lowest Observed Effect Level (LOEL) is $300 \text{ } \mu\text{g/L}$ which is an acute value for saltwater organisms (EPA 1986).

Exposure to PCP can cause irritation of eyes, nose, and throat; sneezing and coughing; weakness; anorexia and weight loss; sweating; headaches, dizziness, nausea, and vomiting; dyspnea, chest pains, fever, dermatitis, and death by heart failure (Sittig 1985). PCP is fairly toxic to freshwater aquatic life, with a lowest observed effect level (LOEL) of

3.2 µg/L (EPA 1986). The EPA drinking water maximum contaminant level (MCL) for PCP is 1 µg/L (EPA 1991).

A significant potential exposure route at the Jennison-Wright site is direct contact, since the site access restrictions have been frequently circumvented. It has been reported that the doors to the office building are found broken soon after they are repaired. Also, the fences have been climbed and cut to gain access to the site. Inhalation of vapors is also a concern. Although groundwater is not a focus of this EE/CA, spills and/or leaks from the tanks can migrate to surrounding soils and groundwater. The source materials being addressed under this removal action contain very high concentrations of PAHs, and in some cases dioxins and furans and PCP (shown on Tables 2-2 and 2-3), and therefore, potentially pose significant health risks. The removal action is intended to reduce these risks through limiting the potential for exposure to these compounds.

Preliminary health assessments for the site performed by the Illinois Department of Public Health have indicated that human exposure to PAHs and dioxins/furans could result in carcinogenic risks exceeding the 10^{-4} excess cancer risk level (IEPA 1993). Health risks were calculated for several exposure pathways including inhalation/ingestion of contaminated dusts and ingestion of contaminated groundwater. Although these assessments are preliminary in nature and may not address all contaminants present at the site, they do indicate that removal of highly-contaminated areas is necessary to ensure protection of human health. To reduce the potential for human exposure, site access must be properly restricted and highly contaminated source materials should be removed to prevent exposure to these materials and eliminate further migration of contaminants from these sources into the environment.

Removal efforts to be undertaken during this action will address sources and gross visual contamination. Remediation of residual contamination, including applicable standards for cleanup, will be included in the final remedy.

Table 2-1

**WEATHER DATA
NORMALS, MEANS, AND EXTREMES
ST. LOUIS, MISSOURI**

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	YEAR
TEMPERATURE °F:													
Normals													
- Daily Maximum	37.6	43.1	53.4	67.1	76.4	85.2	89.0	87.4	80.7	69.1	54.0	42.6	65.5
- Daily Minimum	19.9	24.5	33.0	45.1	54.7	64.3	68.8	66.6	58.6	46.7	35.1	25.7	45.3
- Monthly	28.8	33.8	43.2	56.1	65.6	74.8	78.9	77.0	69.7	57.9	44.5	34.2	55.4
PRECIPITATION (Inches):													
Water Equivalent													
- Normal	1.72	2.14	3.28	3.55	3.54	3.73	3.63	2.55	2.70	2.32	2.53	2.22	33.91
- Maximum Monthly	5.38	4.17	6.67	9.09	7.25	9.43	10.71	6.44	8.88	7.12	9.95	7.82	10.71
- Year	1975	1974	1978	1970	1961	1985	1981	1970	1984	1984	1985	1982	July 1981
- Minimum Monthly	0.22	0.25	1.09	0.99	1.02	0.47	0.60	0.08	T	0.21	0.44	0.32	T
- Year	1970	1963	1966	1977	1972	1959	1970	1971	1979	1975	1969	1958	Sept 1979

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Table 2-2

**ANALYTICAL SUMMARY
JENNISON-WRIGHT SITE
GRANITE CITY, ILLINOIS**

Compound/Analyte	West Tank (160,000-gallon)	Buried RR Tank Car	East Tank (160,000-gallon)	RR Tank Car North Side	Jennite Pit	Northeast Soil 0' - 1'
VOLATILES (ppb)						
Methylene Chloride	51,000.00 B	140.00 B	25,000.00 JB	22,000.00 B	Trace	NA
Benzene	150,000.00	120.00	18,000.00	22,000.00	Trace	NA
Toluene	180,000.00	470.00	360,000.00	40,000.00	Trace	NA
Ethylbenzene	92,000.00	280.00	340,000.00	34,000.00	Trace	NA
Xylene (total)	280,000.00	2,200.00	600,000.00	110,000.00	---	NA
SEMIVOLATILES (ppb)						
Phenol	3,200,000.00 J	---	920,000.00	---	---	NA
2-Methylphenol	940,000.00 J	--	640,000.00	---	NA	NA
4-Methylphenol	---	---	1,900,000.00	---	NA	NA
2,4-Dimethylphenol	---	---	1,900,000.00	---	---	NA
Naphthalene	110,000,000.00 D	170,000.00	89,000,000.00 D	280,000,000.00	1,290,000.00	6,600.00
2-Methylnaphthalene	20,000,000.00	220,000.00	14,000,000.00 JD	42,000,000.00 J	NA	NA
Acenaphthylene	2,000,000.00 J	---	1,400,000.00	---	140,000.00	4,100.00
Acenaphthene	31,000,000.00	190,000.00	23,000,000.00 D	70,000,000.00	1,420,000.00	1,500.00
Dibenzofuran	23,000,000.00 D	110,000.00	14,000,000.00 JD	47,000,000.00 J	NA	NA
Fluorene	35,000,000.00 D	190,000.00	19,000,000.00 JD	60,000,000.00 J	180,000.00	3,000.00

Key at end of table.

M-10-1050, 1-10-05, 11-20-05, D-1

Table 2-2

**ANALYTICAL SUMMARY
JENNISON-WRIGHT SITE
GRANTE CITY, ILLINOIS**

Compound/Analyte	West Tank (160,000-gallon)	Buried RR Tank Car	East Tank (160,000-gallon)	RR Tank Car North Side	Jennite Pit	Northeast Soil 0' - 1'
SEMIVOLATILES (ppb) (Cont.)						
Pentachlorophenol	---	190,000.00 J	---	---	---	---
Phenanthrene	97,000,000.00 D	640,000.00	61,000,000.00 D	200,000,000.00	*	*
Anthracene	85,000,000.00 D	190,000.00	---	25,000,000.00	160,000.00	9,900.00
Di-n-butylphthalate	---	---	---	---	---	NA
Fluoranthene	46,000,000.00	1,200,000.00	28,000,000.00 D	98,000,000.00	500,000.00	19,100.00
Pyrene	31,000,000.00	1,100,000.00	21,000,000.00 D	63,000,000.00	340,000.00	26,800.00
Butylbenzylphthalate	---	---	---	---	---	NA
Benzo(a)anthracene	8,600,000.00	240,000.00	4,900,000.00 JD	15,000,000.00 J	**	**
Chrysene	11,000,000.00	440,000.00	4,600,000.00 JD	18,000,000.00 J	1,810,000.00	26,100.00
Benzo(b)fluoranthene	3,200,000.00 J	280,000.00	1,400,000.00 JD	---	1,160,000.00	18,400.00
Benzo(k)fluoranthene	3,800,000.00 J	170,000.00	1,700,000.00	---	***	***
Benzo(a)pyrene	3,900,000.00	120,000.00	2,900,000.00	---	180,000.00	---
Indeno(1,2,3-cd)pyrene	1,800,000.00 J	130,000.00	560,000.00	---	---	---
Benzo(g,h,i)perylene	1,700,000.00 J	94,000.00	440,000.00	---	---	---

Table 2-2

**ANALYTICAL SUMMARY
JENNISON-WRIGHT SITE
GRANITE CITY, ILLINOIS**

Compound/Analyte	West Tank (160,000-gallon)	Buried RR Tank Car	East Tank (160,000-gallon)	RR Tank Car North Side	Jennite Pit	Northeast Soil 0' - 1'
INORGANICS (ppm)						
Aluminum	1,200.00	4,700.00	52.00	670.00	NA	NA
Arsenic	11.00	2.50	1.00	4.70	3.00	NA
Barium	(17.00)	110.00	(1.70)	(12.00)	NA	NA
Beryllium	---	0.52	---	---	0.76	NA
Cadmium	5.00	---	---	---	---	NA
Calcium	2,100.00	28,000.00	(120.00)	(700.00)	NA	NA
Chromium	10.00	13.00	2.90	6.50	64.00	NA
Cobalt	---	5.50	---	---	NA	NA
Copper	16.00	23.00	11.00	---	31.00	NA
Iron	2,400.00	8,500.00	110.00	2,000.00	NA	NA
Lead	290.00	37.00	2.10	8.90	110.00	NA
Magnesium	(620.00)	7,900.00	(29.00)	(130.00)	NA	NA
Manganese	67.00	670.00	4.60	29.00	NA	NA
Mercury	3.30	0.21	---	0.23	0.12	NA
Nickel	---	9.00	---	---	4.00	NA
Potassium	(770.00)	820.00	---	---	NA	NA
Selenium	2.00	---	---	---	0.22	NA

Key at end of table.

ANALYTICAL SUMMARY

Table 2-2

**ANALYTICAL SUMMARY
JENNISON-WRIGHT SITE
GRANITE CITY, ILLINOIS**

Compound/Analyte	West Tank (160,000-gallon)	Buried RR Tank Car	East Tank (160,000-gallon)	RR Tank Car North Side	Jennite Pit	Northeast Soil 0' - 1'
INORGANICS (ppm) (Cont.)						
Silver	(3.50)	---	---	---	2.60	NA
Sodium	(420.00)	540.00	(92.00)	(750.00)	NA	NA
Thallium	---	---	---	---	---	NA
Vanadium	(4.70)	18.00	---	---	NA	NA
Zinc	340.00	110.00	13.00	66.00	89.00	NA
TENTATIVELY IDENTIFIED COMPOUNDS (ppb)						
1,2,2-Trifluoroethane	19,000.00 J	---	160,000.00 J	---	--	---
Trichlorofluoromethane	---	---	---	40,000.00	---	---
2-Ethyl-naphthalene	5,400,000.00 J	---	---	---	---	---
4-Methyl-dibenzofuran	2,200,000.00 J	---	---	---	---	---
Dibenzothiopene	6,500,000.00 J	---	---	---	---	---
9H-Carbazole	38,000,000.00 J	---	---	---	---	---
Isoquinoline	---	---	140,000.00 J	---	---	---
1,2-Benzenedicarboxylic acid	---	---	96,000.00 J	---	---	---

ecology and environment

recycled paper

2-18

Key:

NA = Not analyzed.

***** = Anthracene and phenanthrene are an isomeric pair that cannot be separated under these chromatographic conditions. The values are based on calculations using a combined standard.

****** = Chrysene and benzo(a)anthracene are an isomeric pair. Values are based on a combined standard.

******* = Benzo(b)fluoranthene and benzo(k)fluoranthene are an isomeric pair. Values are based on a combined standard.

Table 2-3

**DIOXIN/FURAN ANALYTICAL RESULTS SUMMARY
JENNISON-WRIGHT SITE
GRANITE CITY, ILLINOIS**

Compound (ppb)	Sample Location	Jennite Pit	West Tank (160,000- gallon)	East Tank (16,000- gallon)	East Tank (160,000- gallon)	RR Tank Car North Side	Buried RR Tank Car	Buried RR Tank Car
	Media	Tar	Tar	Aqueous	Oil	Tar	Sludge	Aqueous
2,3,7,8-TCDD		ND	ND	ND	ND	ND	ND	ND
Total TCDD		ND	ND	ND	ND	ND	ND	0.00755
1,2,3,7,8-PeCDD		0.051	ND	ND	ND	ND	ND	ND
Total PeCDD		3.0	ND	ND	ND	ND	ND	ND
1,2,3,4,7,8-HxCDD		3.0	ND	ND	ND	4.8	0.302	ND
1,2,3,6,7,8-HxCDD		3.2	ND	ND	ND	71.1	6.45	0.197
1,2,3,7,8,9-HxCDD		2.5	ND	ND	ND	ND	0.791	0.00799
Total HxCDD		160	22.9	ND	9.66	1,490	23.7	0.566
1,2,3,4,6,7,8-HpCDD		230	35.9	ND	32.1	3,140	237	8.14
Total HpCDD		2,900	35.9	ND	32.1	3,140	237	8.14
OCDD		5,200	416	0.0113	680	66,400	5,130	124
2,3,7,8-TCDF		ND	ND	ND	ND	ND	ND	ND
Total TCDF		0.085	ND	ND	0.424	0.321	ND	ND
1,2,3,7,8-PeCDF		0.042	ND	ND	ND	ND	0.375	0.00312
2,3,4,7,8-PeCDF		0.074	ND	ND	ND	ND	ND	ND

Key at end of table.

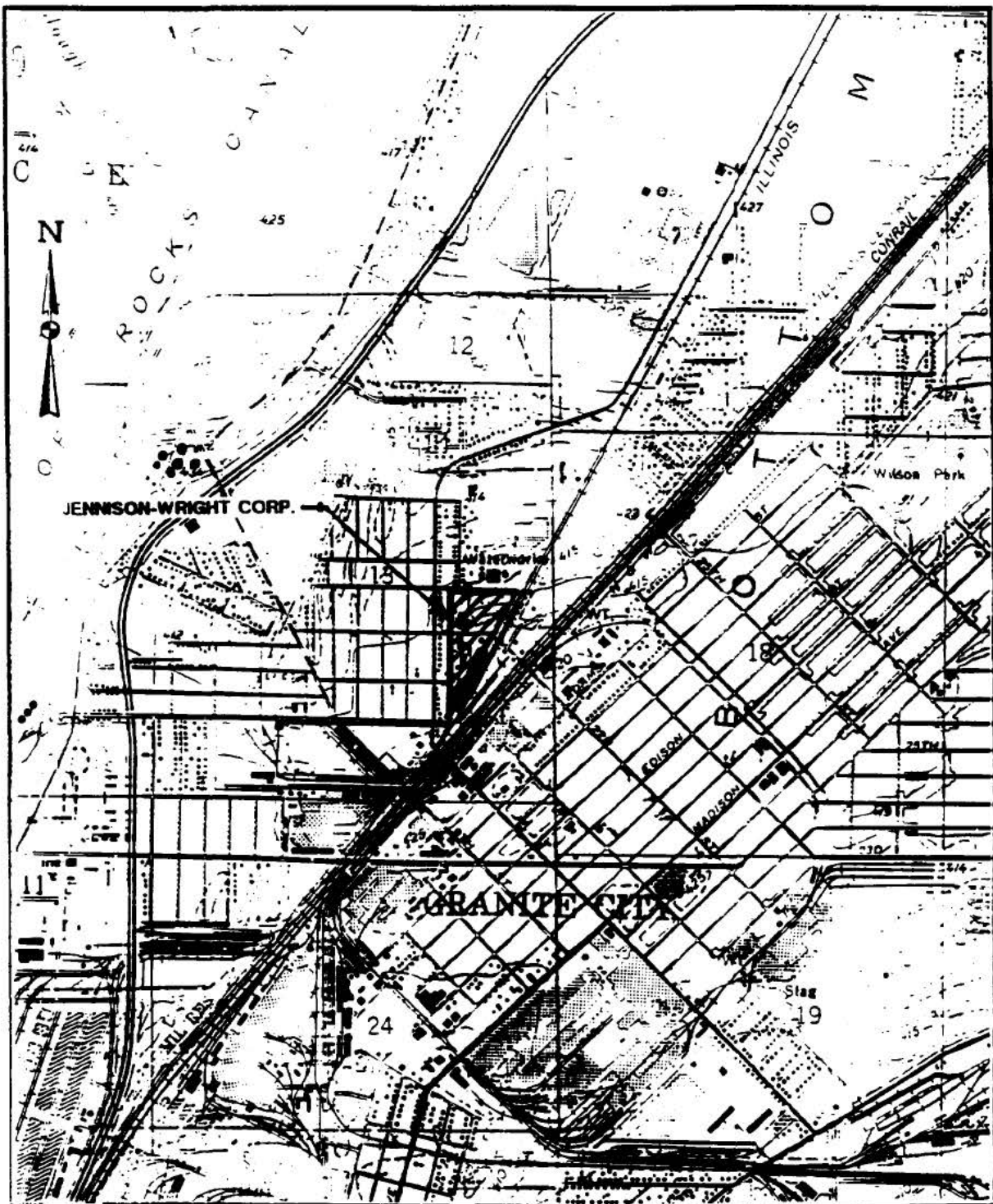
Table 2-3

**DIOXIN/FURAN ANALYTICAL RESULTS SUMMARY
JENNISON-WRIGHT SITE
GRANITE CITY, ILLINOIS**

Compound (ppb)	Sample Location	Jennite Pit	West Tank (160,000- gallon)	East Tank (16,000- gallon)	East Tank (160,000- gallon)	RR Tank Car North Side	Buried RR Tank Car	Buried RR Tank Car
	Media	Tar	Tar	Aqueous	Oil	Tar	Sludge	Aqueous
Total PeCDF		0.48	ND	ND	ND	2.17	3.46	0.0412
1,2,3,4,7,8-HxCDF		0.54	ND	ND	ND	11.8	1.11	0.0569
1,2,3,6,7,8-HxCDF		0.066	ND	ND	ND	ND	ND	0.0195
2,3,4,6,7,8-HxCDF		0.12	ND	ND	ND	ND	0.537	0.00938
1,2,3,7,8,9-HxCDF		0.17	ND	ND	ND	2.68	0.885	0.0104
Total HxCDF		15	1.59	ND	ND	442	55.1	1.28
1,2,3,4,6,7,8-HpCDF		18	2.32	nd	1.27	416	32	1.47
1,2,3,4,7,8,9-HpCDF		2	ND	ND	ND	18.3	2.8	0.124
Total HpCDF		120	11.9	ND	1.27	2,270	192	7.58
OCDF		150	ND	ND	ND	3,220	48.9	35.1
Total Dioxins/Furans		8,549	488	0.0113	723	76,964	5,690	177
Total 2,3,7,8-TCDD Toxicity (1989 ITEF) Equivalents		8.8	0.8	0.000011	1	110	8.9	0.28

Key:

ND = Not detected



USGS GRANITE CITY IL-MO QUAD. 7.5 MIN. SERIES 1954, 1982

SCALE

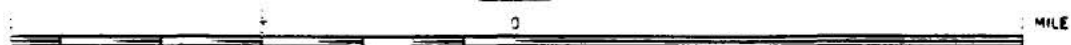
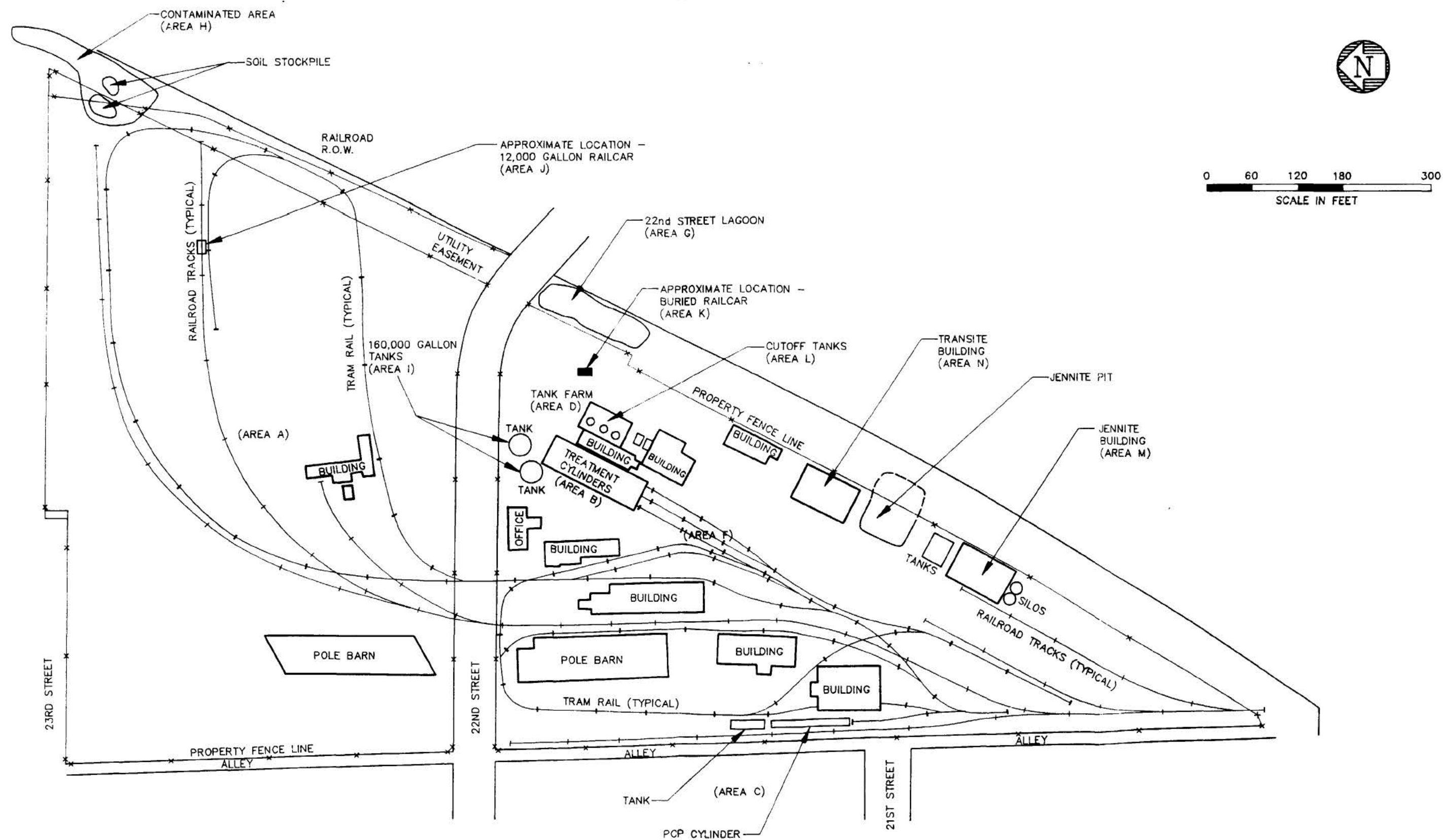


FIGURE 2-1 SITE LOCATION
2-22



SOURCE: REVISED FROM WOODWARD-CLYDE CONSULTANTS, 1988

FIGURE 2-2 SITE FEATURES
2-23

3. IDENTIFICATION OF REMOVAL ACTION OBJECTIVES

This removal action is being implemented as part of the SACM process. The SACM process has been created within the framework of CERCLA and the NCP to expedite cleanup and efficiency in the Superfund process.

3.1 STATUTORY LIMITS ON REMOVAL ACTIONS

Section 300.415 (b)(4) of 40 CFR allows at least 6 months lead-time before cleanup must begin on a non-time-critical removal action, if such action is appropriate to the site conditions. In addition, the lead agency shall conduct an EE/CA or its equivalent to identify and analyze removal alternatives for a site, pursuant to Section 300.425 (4) (i).

Section 300.415 (b) (5) of 40 CFR stipulates that the cost and the duration of a removal action be limited to \$2 million and 12 months, respectively. There are two types of exemptions to these statutory removal limits, in accordance with Section 104 (b) of CERCLA: 1) the "emergency" waiver; and 2) the "consistency" waiver. The "emergency" waiver provides additional funding or extends the removal action time when continued response actions are immediately required to prevent, limit, or mitigate an immediate risk to public health or welfare or the environment. The "consistency" waiver provides additional funding or extends the removal action time to implement a removal action that is otherwise appropriate and consistent with the final response action to be taken. In this EE/CA, one of the factors considered in the evaluation of each removal alternative is whether the removal can be completed within the statutory limits, or whether the removal could qualify for an exemption from the limits. However, the statutory limits on removal actions apply only to fund-financed actions. If PRPs perform the removal, the limits do not apply.

3.2 REMOVAL ACTION SCOPE AND OBJECTIVES

To justify conducting a removal action, IEPA must determine that the site poses a threat to public health or welfare, or the environment. In the National Contingency Plan (NCP), 40 CFR 300.415 (b)(2) provides eight factors to be considered in making that determination. If, based on these factors, IEPA determines that a threat exists, a removal action is justified in order to abate, prevent, minimize, stabilize, mitigate, or eliminate the release or threat of release of hazardous substances. As set forth in the following paragraphs, IEPA has evaluated these factors and determined that a removal action is justified.

The west 160,000 gallon tank contains approximately 8,000 gallons of tarry sludge. There is a hole cut in the side of the tank, which could allow rainwater and/or persons to enter. The east 160,000 gallon tank contains approximately 12,000 gallons of water, which may have accumulated through an opening in the roof, and approximately 12,000 gallons of oil. In addition, these tanks are old and deteriorating. Although the site is fenced, break-ins occur on a regular basis. IEPA personnel find the door to the office forced open every time they visited the site. This allows anyone in the area access to the southern portion of the site. The potential for exposure to humans and animals exists. Weather conditions may cause one of the tanks to overflow and release contaminants since rainwater can enter the tank; such a situation would increase the cost of the removal. Also, the physical hazards of the tanks pose a threat to public health. Therefore, the objectives of the removal action are to reduce/eliminate the risk associated with direct contact with the wastes and to eliminate the physical hazards and the possibility of overflow associated with the tanks.

The buried 12,000 gallon railroad tank car also poses a hazard to anyone entering the site. The rail car was used for PCP storage and disposal, and does not have a permanent cover. A large piece of concrete has been placed over the opening as a temporary measure, and poles have been put in place to warn of the tank opening. This tank poses a potential threat of exposure to humans and animals through direct contact, and a potential for release to the soil and groundwater from leakage. The tank is now filled with water and oil/sludge. Rainwater may flow into the tank and cause the tank to overflow. The objective for removal of this tank is to reduce/eliminate the risk associated with direct contact and leakage of wastes.

Another 12,000 gallon railroad tank car now contains about 4,000 gallons of black to dark brown liquid and sludge and may leak, releasing the contents to the environment. Also,

a physical hazard exists because the site is not secure. The objectives for this tank are the same as for the buried tank.

In the Transite building, one hundred seventy four 55-gallon drums are being stored. Fifteen of these drums contain asbestos contaminated with creosote, 10 drums are believed to be drill cuttings from monitoring well installation, and the contents of the remaining drums are unknown. Thirty-eight drums were in the building prior to May 4, 1992. There is no additional information regarding these drums which have been stored on-site for over one year. The objective for these drums is to find a permanent disposal option that meets the requirements of the Resource Conservation and Recovery Act (RCRA). Because the source of the materials within the drums is unknown, the drums should be sampled and hazard categorized to determine the nature of the waste for disposal.

At the northeast corner of the site are a waste pile and a swale area that receives site runoff; neither is secure. There is no fence to prevent access by local residents. The objective for this area is to reduce/eliminate the risk associated with direct contact with the waste by constructing a fence.

Tar from the creosote wood preserving and "Jennite" production operations was disposed of in a pit along the southeastern property boundary. This creosote and tar had previously seeped through the berms and migrated off site. An earlier stabilization effort provided temporary berms to contain the waste; however, there is still the potential for waste migration from the pit. The pit poses a potential for exposure to both humans and animals, as animal carcasses have been discovered embedded in pit materials. Due to the sandy soil at the site, there is the potential for further groundwater contamination under the site. High levels of creosote are buried near the surface and continue to migrate. Warm weather may cause the tar to become less viscous and migrate through the soil. The objectives for the pit are to reduce/eliminate the risk associated with direct contact and reduce/eliminate the migration of the wastes to the surface and to the groundwater.

There are no other federal or state response mechanisms to respond to these situations. Therefore, a non-time-critical removal action is the most appropriate recourse for addressing site conditions until a more thorough investigation can be performed.

This removal action will not address any groundwater contamination that may exist at the site. Also, this removal action will not address any surface contamination along the rails in the south or in the drip area in the northern portion of the site.

3.3 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

Section 300.415 (i) of the NCP states that fund-financed removal actions under CERCLA Section 104 shall, to the extent practicable considering the exigencies of the situation, attain applicable or relevant and appropriate requirements (ARARs) under federal or state environmental or facility-siting laws. Other advisories, criteria, or guidance may be considered for a particular site.

Under CERCLA, as amended by SARA, a requirement may be either "applicable" or "relevant and appropriate" to a specific removal action, but not both. The definition of the components of ARARs are listed below:

1. **Applicable Requirements** means those cleanup standards, standards of control and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable.
2. **Relevant and Appropriate Requirements** means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate.

ARARs are categorized into three main groups: chemical, location, and action specific. Each group is defined below:

1. **Chemical Specific:** Requirements that set technology or risk-based concentrations/limits in various media. This group can also be used to determine discharge limits, treatment standards, and disposal requirements for removal activities. Chemical-specific ARARs are also used in evaluating the effectiveness of removal alternatives.
2. **Location Specific:** Requirements that provide a basis for assessing the restrictions during the formulation and evaluation of potential location-specific remedies. Removal action alternatives may be restricted by federal and state laws concerning proximity of sensitive human populations and environments.

3. **Action Specific:** These requirements are activated during the consideration of removal alternatives. Action-specific requirements govern such categories as air emissions, treatment residues, and off-site disposal policies.

All pertinent ARARs for the proposed removal action of the Jennison-Wright site are attached in Appendix A of this EE/CA. The extent to which each of the various removal action alternatives complies with ARARs is discussed in Section 5 of this EE/CA.

3.4 PLANNED REMEDIAL ACTIVITIES

An RI/FS is planned for the Jennison-Wright site, although the schedule and scope of the study has not been established at this time. IEPA recently completed an HRS package that, upon review by USEPA, would qualify the site for the National Priorities List (NPL). If this site is listed on the NPL, a time table for remedial action will be determined.

This EE/CA is the preliminary step to a removal action at this site. The public will have a 30-day period to review the EE/CA. The removal should occur within six months to one year after the EE/CA is completed.

4. IDENTIFICATION AND SCREENING OF REMOVAL ACTION TECHNOLOGIES

Based upon the information currently available regarding the JW Site, specific removal actions and technologies were identified to address the removal action objectives delineated in Section 3. Although specific actions and technologies are discussed individually within this section, a comprehensive removal action may consist of several components (i.e., more than one action or technology).

The materials being addressed by this removal action, for the most part, can be categorized into six separate groups. These contaminated media include:

- **Soils** - An estimated 225 cubic yards of grossly contaminated (i.e., visibly stained or saturated) soils at the site, including surface soils surrounding the 160,000 gallon tanks (approximately 40 cubic yards), surface soil beneath the railcar (approximately 15 cubic yards), soil in drums stored in the Transite building (approximately 119 drums, for a total of 30 cubic yards), and soil currently stored in the cutoff tanks (approximately 140 cubic yards). Other soil contamination at the site will not be addressed under this removal action. However, the scope of this action does include limiting access to a mound of soil and a drainage swale located northeast of the facility that is outside the fence, and is therefore not secured.
- **Aqueous Waste** - An estimated 27,000 gallons of liquid wastes primarily consisting of contaminated water including: 12,000 gallons in the east 160,000-gallon tank, 10,500 gallons in the buried railcar, water in drums stored in the Transite building (approximately 40 drums, for a total of 2,000 gallons), and wastewater generated during decontamination of tanks (estimated to be 2,500 gallons).
- **Creosote Waste** - An estimated 25,550 gallons of oil and sludge, including 8,000 gallons of tarry sludge in the west 160,000-gallon above-ground tank, 12,000 gallons of oil in the east 160,000-gallon above-ground storage tank, 1,500 gallons of sludge in the buried railcar, 4,000 gallons of oil in the above-ground railcar, and 50

gallons of oil/sludge anticipated to be generated during treatment of aqueous wastes.

- **ACM Contaminated with Creosote** - Fifteen 55-gallon drums of ACM contaminated with creosote stored in the Transite building.
- **Tanks** - Two 160,000 gallon tanks, a buried 12,000 gallon railcar, an aboveground 12,000 gallon railcar, and three small cutoff tanks. Scrap from salvage operations will be addressed as part of removal activities.
- **Jennite Pit** - Approximately 3,560 cubic yards of waste material in the Jennite pit, consisting primarily of creosote and Jennite.

Materials in 174 of the drums at the site have been included in the above volume estimates. It was assumed that 40 drums contained contaminated water and 119 drums contained soil. However, the actual contents of the drums have not been accurately established. Drummed material will require characterization prior to removal/disposal. Only one disposal option has been identified for the 15 drums of ACM contaminated with creosote, which is a Chemical Waste Management landfill located in Emelle, Alabama. Because only one option was identified for ACM contaminated with creosote, a thorough evaluation of alternatives is not provided herein.

Appropriate removal actions and technologies have been identified for each of the six types of contaminated media described above.

4.1 IDENTIFICATION OF TECHNOLOGIES

In order to meet the remedial action objectives established in Section 3, remedial technologies were identified and screened. The identification and screening processes are discussed in Sections 4.1 and 4.2. Subsequent subsections describe the technologies that were retained as a result of the screening. Technologies were identified and screened for the remediation of soils, aqueous wastes, non-aqueous creosote wastes, and abandoned above and underground tanks.

Applicable removal action technologies were identified for each media based upon engineering judgement, taking the following factors into account:

- Site conditions and characteristics that may affect implementability;

- Physical and chemical characteristics of contaminants that determine the effectiveness of various technologies; and
- Performance and operating reliability of various technologies.

Cost criteria were not considered in the identification of applicable removal technologies. Removal action technology types can encompass a number of removal action process options. Process options are defined as specific processes, systems, or actions that may be utilized to remediate or mitigate contamination. Process options are generally combined to form removal action alternatives. The technologies and process options that have been identified to address each contaminated media are discussed below.

4.2 SCREENING OF TECHNOLOGIES

An initial screening of removal technologies and process options, based upon the criteria of effectiveness, implementability, and cost, was conducted to refine the complete list of technologies initially identified. The criteria used are described as follows:

- **Effectiveness** - An evaluation of the potential effectiveness of process options in controlling the estimated areas or volumes of media to be protective of human health and the environment, and meeting the removal action objectives by reducing or eliminating the potential for direct contact with waste materials and by minimizing the potential for further migration of contamination from source areas.
- **Implementability** - An evaluation of the technical and administrative feasibility of a technological process. Technologies requiring prohibitively extensive permitting will also be eliminated. If sufficient treatment, storage, or disposal capacity is not available for certain off-site options, these also may be discarded. Processes that are unable to meet ARARs will not necessarily be eliminated since the actions under this removal may not be the final remediation action.
- **Cost** - A rough, relative estimate of capital, and operating and maintenance (O&M) costs. Cost will be a factor in comparing technologies that can produce similar levels of protection for potential receptors. This criterion plays a limited role in the screening of technologies.

The removal technologies and process options that were identified to address contaminated soil, aqueous wastes, non-aqueous creosote wastes, and abandoned tanks are listed in Tables 4-1, 4-2, 4-3, and 4-4, respectively. These tables also summarize the evalua-

tion of each option based upon the criteria of effectiveness, implementability, and cost. These criterias were used to eliminate those removal actions that are unproven, not applicable to site conditions, not expected to achieve an acceptable level of performance, or prohibitively expensive. Removal actions that would be extremely difficult to implement were also discarded.

The evaluations of technologies summarized in Tables 4-1, 4-2, 4-3, and 4-4 are based upon available information and do not necessarily reflect factors such as the volume of contaminated media, which may affect the applicability of the technology, or the interrelationship of the various technologies. Some technologies that are considered viable for further evaluation may not be effective when evaluated alone but may provide a viable action when combined with other technologies. Those technologies that were evaluated are discussed below.

4.3 TECHNOLOGIES TO ADDRESS CONTAMINATED SOIL

Technologies can be applied to contain, remove, or treat grossly contaminated soil in the area of the JW site. This section addresses contaminated soil and spilled wastes around the abandoned tanks and the waste pile in the northeast corner of the site. Because only grossly (visible) contamination will be addressed during this removal action, the soil and waste will be considered one media. The following technology options have been identified specifically for soil contamination at the JW site.

4.3.1 Institutional Actions

Land use restrictions, encompassing such items as warning signs and access restrictions (e.g., fences) can be utilized to limit exposure to contaminated media. These options do not directly affect the chemicals or affected media and provide no means of remediation, but rather serve as a barrier to minimize or eliminate direct human contact with affected soil.

4.3.2 Containment

Containment options do not directly affect the contaminated soil and provide no means of remediation, but serve as a barrier to limit further migration of contaminants within the soil. Containment measures are summarized in the following sections.

Capping

Contaminated soil can be capped with a layer of clay, asphalt, or concrete that would serve several purposes:

- to restrict precipitation from infiltrating the soil and mobilizing contaminants;
- to limit surface runoff of contaminated soil; and
- to reduce the potential for direct human contact with contaminated soil through direct dermal exposure or inhalation of windborne dust particles.

Cap placement will be difficult around storage tanks if they remain in place. If the tanks are removed, the contaminated soils would be disturbed and spread; or the cap would be damaged if placed prior to removal.

Vertical Barriers

Slurry walls, grouting, and sheet piling are typical examples of vertical barriers that could be constructed around the perimeter of areas of soil contamination. Vertical barriers would provide a means of limiting the migration of soil contaminants, but would not restrict precipitation from infiltrating the soil and mobilizing contaminants for vertical migration, reduce the potential for direct human contact with contaminated soil, or provide permanent remediation since no treatment would be involved. Placement of vertical barriers would require the use of conventional materials and equipment. Long-term maintenance of vertical barriers may be required.

Horizontal Barriers

Horizontal barriers can underlie an area of contaminated materials, thereby limiting migration of the material. Established technologies use grouting techniques to reduce the permeability of underlying soil layers. Horizontal barriers would not reduce the potential for direct human contact with contaminated soil, or provide remediation since no treatment would be involved. Few horizontal barriers have been constructed and long-term maintenance may be necessary.

Conclusion

Because conventional grout technology cannot provide a reliable impermeable horizontal barrier, horizontal barriers will not be considered further. Vertical barriers will not prevent vertical migration of the contaminants and are not effective for surface contamination. Therefore, vertical barriers will not be retained for further analysis.

4.3.3 Removal

The removal of contaminated soils could be accomplished by excavating on-site soils. Excavation is an effective method for physically removing contaminated surface and subsurface soils from the site. Excavation involves the use of standard construction equipment that is adapted to minimize secondary migration. There are no limitations on the types of waste that can be excavated and removed. Factors to be considered while evaluating the usefulness of this technology include an assessment of the mobility of the waste, comparison with the feasibility of *in situ* treatment, and the cost of disposing or treating the waste once it has been excavated. A possible useful application of excavation would be to remove contaminant "hot spots" and use other remedial measures for less contaminated soils.

Excavation of soils around the above and underground storage tanks will be necessary if such structures are to be removed and dismantled. Excavation will be considered as a viable option for soils in the cutoff work tanks and for any "hot spot" area soils identified around tanks.

4.3.4 Soil Treatment Technologies

Potential soil treatment technologies can be employed either on site or off site using one of the following three general approaches:

- On-site treatment using mobile treatment systems;
- On-site construction and operation of treatment systems; and
- Transporting of contaminated soil/waste to an off-site treatment facility.

During the initial technology screening process, a broad range of treatment options was considered for the organic and inorganic contaminants of potential concern at the JW facility. The treatment technologies considered are discussed below.

Physical/Chemical Treatment Processes

Physical treatment processes can be used to separate the waste stream by either applying physical force or changing the physical form of the waste, while chemical treatment processes alter the chemical structure of the constituents to produce a waste residue that is less hazardous than the original waste. Further, the altered constituents may be easier to remove from the waste stream. Physical and chemical processes can also be used to immobilize contaminants within the waste material. In addition, physical and chemical treatment technologies are utilized to treat organic hazardous waste that is either non-biodegradable or resistant to biodegradation. Physical/chemical treatment options that were evaluated for contaminated soils at the JW facility are discussed below.

- **Solidification/Stabilization** processes involve mixing soil/waste with a solidifying agent, such as cement, to form an impermeable, stable matrix. Contaminants in the soil would be mechanically locked within the solidified soil matrix, and therefore would be less mobile.

This process is particularly useful for treating metals-contaminated soils but not for soil contaminated with organics. This method is not appropriate for the soils/waste at the JW site.

- **Soil Washing** is an extraction process that removes organic and inorganic contaminants from the soil by using a liquid medium as a washing solution. Solutions with the greatest potential for use in soil washing include water, acids/bases, chelating agents, surfactants, and certain reducing agents. The excavated soil is first passed through a screen to remove debris and large objects. The soil is then mixed with the washing solution to form a slurry. This slurry is processed and separated into coarse and fine particle fractions by vibrating screens. The coarse soil fraction would be the product of the soil washing treatment process and the fine particles would be removed from the used wash solution by flocculation and gravity. The used wash solution generated by this process retains the contaminants and must be treated and/or disposed of as liquid waste.
- **Dechlorination** is a treatment process that uses a chemical reaction to replace the chlorine atoms in chlorinated aromatic molecules (such as PCP, dioxins, and furans) with an ether or hydroxyl group. By stripping the chlorine atoms, the toxicity of the chlorinated aromatic compounds is reduced or eliminated. An evaluation of the end products would be required to determine whether further treatment is required.

- **Chemical Oxidation** is a treatment technology in which chemical compounds are added to oxidize contaminants and liberate free oxygen. Use of elevated temperatures and catalysts can enhance the oxidation process. Partially oxidized products would require further treatment.
- **Acid Extraction** is a treatment technology in which hazardous metals are removed from soils and sludges through application of an acidic solution. This technology is not appropriate for organic contamination. Further treatment would be required for the resulting metals-containing acid solution.
- **Solvent Extraction** is a treatment technology in which organic contaminants are separated from the soil particles, becoming dissolved or dispersed in a liquid solvent. The contaminants are subsequently removed from the liquid waste stream, generally using conventional wastewater treatment systems, and the solvent is recycled, if possible.

Conclusion

Although chemical oxidation may be effective in treating organic and inorganic slurried soil and sludge, this technology will not be retained for further consideration, because its application in environmental remediation of contaminated soils is very limited. Acid extraction also will not be retained because it is only effective for treating metals-contaminated soils. Solvent extraction will not be retained because of the difficulty of extracting all solvent from the soil, and the generation of liquid wastes that still require treatment. Stabilization/solidification is a proven technology for metals-contaminated soils, but not for high concentration organic wastes. The soil washing technology would be effective in segregating organic contaminated feed soil into a fine-particle soil fraction that retained the bulk of the contamination in a small mass; however, all soils would still require treatment because of the significant contaminant levels. Dechlorination, or dehalogenation, has been demonstrated to be effective in treating PCP and dioxin-contaminated soils, and may be required to make the soil acceptable to disposal or treatment facilities. Based upon E & E's evaluation of the effectiveness of the above-listed technologies in treating organic-contaminated soils similar to those detected at the JW facility, the only physical/chemical treatment process retained for further analysis is dechlorination.

Thermal Treatment Technologies

Thermal treatment methods use high-temperature oxidation under controlled conditions to degrade substances into carbon dioxide, water, hydrogen chloride, sulfur oxides, and ash. Thermal destruction is a proven technology that can effectively treat all organic compounds. Thermal treatment technologies considered for the contaminants of potential concern at the JW facility are described below.

- **Rotary Kiln Incineration** utilizes a long, rotating kiln that is slightly inclined. Wastes and auxiliary fuel are fed into the elevated end of the kiln. The waste material combusts as it passes through the kiln. The kiln is slowly rotated to enhance mixing of the waste with combustion air. Flue gases are passed through an afterburner for further oxidation and are subsequently treated using conventional air pollution control equipment. Ash is removed at the lower end of the kiln. The rotary kiln is the most commonly used incineration method for contaminated soils.
- **Infrared Incineration** uses infrared energy as an auxiliary heat supply for destruction of combustible materials. Materials to be treated are conveyed through a primary combustion chamber, where organics are volatilized and partially combusted. Exhaust gases pass through a secondary chamber to ensure complete combustion of organics, followed by treatment by pollution control equipment.
- **Fluidized-Bed Incineration** uses granular, inert material in a refractory-lined vessel to improve heat transfer to the waste material being incinerated. Air is blown through the material, causing it to mix like a fluid. The high mixing energies aid in the combustion process, resulting in lower operating temperatures than other types of incinerators. Treatment of the incinerator off-gas is required.
- **Pyrolysis** is a high-temperature thermal destruction technology in which destruction of organic materials occurs in the absence of oxygen. The product of pyrolysis is a gas that contains low-molecular weight hydrocarbons, CO₂, H₂, methane, and solid ash material.
- **Thermal Desorption** is used to transfer volatile and semivolatile organic compounds from a solid matrix into a gas stream, typically using air, heat, and mechanical agitation. The organic compounds transferred into the gas stream are then subjected to further treatment (e.g., carbon adsorption or high-temperature incineration).
- **Fuels Blending** can be used to process liquid organics, sludges, and solids into fuel for powering cement kilns. Wastes must meet

specifications for chemical content and BTU value. Temperatures and residence times are maintained to achieve EPA-required destruction and removal efficiencies. Residual ash is incorporated into the finished cement product.

Conclusion

All forms of thermal treatment are potentially effective for treating organics-contaminated soil at the JW site. Because of the similarities between thermal treatment options, two thermal processes have been retained for further analysis as representative options: rotary kiln incineration and fuels blending.

Biological Treatment

Biological treatment processes use indigenous or selectively cultured bacteria, yeast, or fungi to decompose hazardous organic compounds. Biological treatment processes are sensitive to temperature, pH, oxygen concentration, moisture content, availability of nutrients, and concentrations of inhibitory substances (e.g., metals).

- **Ex situ bioremediation** is a technique that involves using microorganisms to degrade organic contaminants in excavated soil, sludge, and solids. Variations include slurry-phase bioremediation, where soil is mixed with water, and solid-phase bioremediation, where soils are placed in a tank or building and tilled with nutrients and water.
- **Landfarming** is a land treatment technology that involves controlled application of a waste on the soil surface and the incorporation of the waste into the upper soil zone. Treatment relies on the dynamic physical, chemical, and biological processes occurring in the soil. As a result, the constituents in the applied wastes are degraded, immobilized or transformed to environmentally acceptable components.

Conclusion

Landfarming will not be considered further because of the potential dust problems and the nearby residential area. The slurry bio-reactor (SBR), an *ex situ* bioremediation technology, should be capable of reducing PCP concentrations in soil. However, it is not well proven for PAHs and would not reduce dioxin concentrations, if present. Biological treatment is not retained for further evaluation.

In situ Treatment

A number of methods are currently being developed that involve physical manipulation of the subsurface in order to immobilize or detoxify waste constituents. These technologies include soil vapor extraction, soil flushing, vitrification, steam injection, and bioremediation, and are described below.

- **Soil Vapor Extraction** is a process for removing volatile organic compounds from soils. A vacuum extraction system consists of a network of extraction wells connected to a vacuum extraction unit through a surface collection manifold. The vacuum induces a flow of air into the extraction wells in order to draw vapors from the soil, bringing about the release of volatile compounds. Depending on the nature and extent of contamination, the extracted gas can either be vented to the atmosphere or to a vapor-phase carbon adsorption system.
- ***In situ* Soil Flushing** is a process for washing organic and inorganic contaminants from soils. A liquid wash solution is injected into contaminated soil and then extracted to flush contaminants from the soil. During this flushing, sorbed contaminants are mobilized into solution through solubility, formation of an emulsion, or chemical reaction with the flushing solution. Spent wash solution requires treatment and/or disposal. This process option is only feasible if soils are relatively homogeneous and fairly coarse-grained. Otherwise, sufficient flow may not be obtained or channeling could occur, in which wash solution is diverted through a few pathways that offer little resistance, while the majority of the contaminated soil does not come into contact with the wash solution. Soil flushing can be enhanced with additives to increase the efficiency of contaminant removal from soil. Soil flushing solutions with the greatest potential for mobilizing metals are dilute acids and complexing and chelating agents.
- ***In situ* Vitrification** is the process whereby contaminated soils and wastes are converted in place into a glassy, solid matrix by means of very high temperatures (1,600 °F to 2,000 °F). The process is carried out by inserting electrodes into the contaminated soil to the desired treatment depth. Non-volatile compounds are trapped in the vitrified mass and organic compounds are destroyed by pyrolysis. The pyrolyzed by-products may escape from the soil surface, in which case they must be collected and treated.
- ***In situ* Steam Injection** for enhanced removal of non aqueous phase liquid (NAPL) could reduce concentrations of organic contaminants within soils. Hot water could be injected through an injection well.

mobilizing NAPLs, which could be recovered by extraction wells. Recovered groundwater would require further treatment.

- ***In situ* Bioremediation** uses indigenous or introduced aerobic and anaerobic microorganisms to break down organic compounds in soil. Enhanced biodegradation, which has been developed furthest and is most feasible for *in situ* treatment, relies on creating favorable aerobic conditions to improve aerobic microbial processes. This method involves optimizing environmental conditions by providing an oxygen source and nutrients, which are delivered to the subsurface through an injection well or infiltration system to enhance microbial activity.

Conclusion

In situ treatment technologies are not really appropriate for the removal action being considered for the JW site. Future investigation and remedial activities would interfere with the operation of an *in situ* system. Therefore, *in situ* technologies will not be retained for further analysis.

4.3.5 Disposal

Off-site Disposal

Wastes generated during the site remediation, either treated or untreated, could be transported off site to a RCRA disposal facility. Any such disposal must comply with land disposal restrictions and other ARARs.

On-site Disposal

Treated wastes could also be landfilled on site. This would eliminate disposal costs; however, some type of containment for the treated waste would be required. In addition, restrictions on future use of the site property would most likely result. On-site landfilling is not considered a viable option because of the nearby residences and other physical limitations at the facility. In the event that treated soil does not contain characteristic waste or contaminants above health-based levels, the soil would be regarded as clean and could be backfilled on site.

Conclusion

Creating an on-site landfill that meets RCRA and/or state requirements or on-site backfilling of treated soil would be difficult due to the adjacent residences and the potential for future remedial actions at the site. Also, future restrictions on land use would occur. Soils treated below health-based levels could be backfilled on site. Off-site disposal in a commercial facility would be protective of human health. Therefore, off-site disposal will be retained for further analysis.

4.4 TECHNOLOGIES TO ADDRESS AQUEOUS WASTES

Aqueous waste treatment of the creosote contaminated water can be applied at the JW site. Liquids in the two 12,000-gallon tanks, water in the east 160,000-gallon tank and any decontamination fluids can be treated using the following technology options:

Potential waste treatment technologies can be employed either on site or off site using one of the following four general approaches:

- On-site treatment using mobile treatment systems;
- On-site construction and operation of treatment systems;
- Pretreatment of contaminated water, followed by discharge to a publicly owned treatment works (POTW); and
- Collection and transportation of contaminated water to an off-site treatment facility.

Although the treatment technologies evaluated for the JW site will not be effective for all contaminants, a combination of technologies should provide the necessary treatment. Treatment technologies identified for the JW site are discussed below.

4.4.1 Physical/Chemical Treatment

Physical treatment processes can be used to separate contaminants from the waste by either applying physical force or changing the physical form of the contaminants, while chemical treatment processes alter the chemical structure of the constituents to produce a waste residue that is less hazardous than the original waste. Further, the altered constituents may be easier to remove from the waste stream.

- **Sedimentation** is the removal of particulate matter, chemical floc, and precipitates from suspension through gravity settling. Settling basins may be constructed in a wide variety of shapes and flow mechanisms and are designed to minimize large-scale turbulence, allowing for the efficient removal of particulates.
- **Filtration** is a treatment process whereby suspended solids (and any associated contaminants) are removed from solution by forcing the fluid through a filtering medium. The filtering medium may be a fibrous fabric (paper or cloth), a screen, or a bed of granular material. Filtration also can be used as a pretreatment for air stripping, carbon adsorption, or ion exchange to reduce the potential for clogging or overloading of these processes.
- **Membrane Separation** technologies separate solutes or contaminants from liquids through the use of semi-permeable membranes. Semi-permeable membranes function by selectively rejecting contaminants based on pore size or charge, or through co-precipitation. Membrane separation technologies include reverse osmosis, ultrafiltration, and electrolysis.
- **Gravity Separation** is used to treat two-phased liquid wastes. This method can be used to separate oil from contaminated water. This process offers a simple, effective means of phase separation, provided the oil and water phases are given sufficient settling time to separate adequately within the tank.
- **Precipitation/Coagulation/Flocculation** is a proven water treatment process that removes colloidal and dissolved solids. The addition of precipitating agents and coagulants converts metals to forms that are less soluble in water. Any dissolved or suspected solids agglomerate to form large particles that can be readily removed from the ground-water by a clarification or filtration process. The performance of the process is affected by chemical interactions, temperature, pH, solubility variances, and mixing effects.
- **Chemical Oxidation** is used primarily for detoxification of cyanide and for treatment of dilute wastestreams containing oxidizable organics. Aldehyde, mercaptans, phenols, benzidine, unsaturated acids, and certain pesticides have been successfully treated by this method. Chemical oxidizers utilized include hydrogen peroxide, potassium permanganate, chlorine, ozone, and chlorine dioxide.
- **Ultraviolet Photolysis/Ozonation** uses a combination of ultraviolet (UV) light and ozone to chemically oxidize organic compounds present in water. Complex organic molecules are broken down into a series of less complex molecules, eventually terminating with carbon dioxide and water. UV/ozonation treatment is effective in

treating a wide variety of chlorinated hydrocarbons and other toxic organics. Ozone dosage and retention time can be adjusted to enhance degradation of certain organics. The treatment is only effective on clear water, so pretreatment filtering would be necessary for water containing high suspended solids concentrations.

- **Activated Carbon Adsorption** removes organics from aqueous contaminated water streams by adsorbing the compounds onto the large internal pore surface area of activated carbon. The process has been demonstrated on a variety of organics, particularly those exhibiting low solubility and high molecular weight. Activated carbon can be used in a treatment column or added in a powdered form to contaminated water. Carbon adsorption can be readily implemented at hazardous waste sites and can remove dissolved organics from aqueous wastes to levels below 1 part per billion (ppb). Cleanup efficiency can be reduced if high concentrations of suspended solids are present in the water.
- **Dechlorination** may be accomplished through the use of reducing agents, including sulfur dioxide or sodium sulfite; activated carbon; alkaline metal polyethylene glycol (APEG); prolonged storage; or sunlight. Dissolving sulfur dioxide into water, where it quickly forms sulfurous acid (which reacts almost instantaneously with free and combined chlorine), is the most effective and least expensive method of dechlorination.
- **Chemical Neutralization/Detoxification** is used to increase or reduce the pH of a wastewater stream. Alkaline wastewater may be neutralized with hydrochloric acid, carbon dioxide, sulfur dioxide, and, most commonly, sulfuric acid. Acidic wastewaters may be neutralized with limestone or lime slurries, soda ash, caustic soda, or anhydrous ammonia. Often, a suitable pH can be achieved through the mixing of acidic and alkaline process wastewaters. Selection of neutralization agents is based on cost, availability, ease of use, reaction byproducts, reaction rates, and quantities of sludge formed.

Conclusion

The following technologies will not be retained for further analysis: reverse osmosis/ ultrafiltration, because extensive pretreatment is required and membranes are susceptible to chemical attack; ion exchange, because natural anions and cations may limit effective removal of the contaminants of potential concern; precipitation, because it is not effective on organic contamination.

Sedimentation is effective in removing precipitates and/or solids from wastewater. Filtration is effective in removing low levels of suspended solids from wastewater. Oil/water

separation is effective in removing oil from extracted water. Chemical and ultraviolet oxidation is effective in treating oxidizable contaminants in wastewater, but the presence of oil may limit its effectiveness. Carbon adsorption is effective in removing low-solubility organics from wastewater. Dechlorination is a potentially effective treatment applicable for dioxin and PCP wastewater contamination. Neutralization would not treat contaminants, but is effective for altering the pH of wastewater, which may be needed to optimize treatment system performance. Therefore, sedimentation, filtration, oil/water separation, carbon adsorption, dechlorination, and neutralization will be retained for further analysis. Comprehensive treatment processes will be developed and evaluated that include a combination of these options to effectively treat all contaminants of potential concern in wastewater at the JW site.

4.4.2 Biological Treatment

All biological treatment systems are designed to expose wastewater containing biologically degradable organic compounds to a suitable mixture of microorganisms in a controlled environment that contains sufficient essential nutrients for the biological reaction to proceed. Biological treatment processes are widely used and, if properly designed and operated, are capable of achieving high organic removal efficiencies.

- **Fixed-film Bioreactor.** This process utilizes a bioreactor containing a fixed medium that serves as a substrate for microbial attachment. Oxygen or oxygen-enriched air can be added to increase oxygen transfer.
- **Activated Sludge Biological Treatment** involves the placement of aqueous waste in a reactor containing a suspension of aerobic bacteria culture. Organics in the aqueous waste are degraded. Oxygen or oxygen-enriched air can be added to increase oxygen transfer.

Conclusion

Biological water treatment systems appear to be a potentially effective technology for treatment of organic wastewater from some wood-preserving sites. However, these processes would be ineffective for PCDDs/PCDFs. Also, the volume of wastewater requiring treatment would not warrant the costs needed to construct an on-site biological treatment system. Therefore, biological treatment will not be retained for further evaluation.

Incineration

4.4.4 Wastewater Disposal

POTW

Deep Well Injection

Surface Water Discharge

4-17

Conclusion

Deep well injection of treated groundwater would likely be subject to unfavorable regulatory standards and therefore will not be retained for further consideration. There are no nearby surface water bodies appropriate for receiving discharges. Also, surface water discharge would likely require more stringent treatment than POTW discharge. POTW discharge is implementable and effective and will be retained for further analysis.

4.5 TECHNOLOGIES TO ADDRESS NON-AQUEOUS CREOSOTE WASTES

This section addresses the creosote and waste creosote in the tanks. Because of the extremely viscous nature of creosote, the only removal action technologies include reuse, thermal treatment, and physical chemical treatment. Biological treatment will not be feasible, since the creosote must be heated to 200°F to become fluid. This high temperature will inhibit biological growth.

4.5.1 Reuse

Creosote could be used by another wood treatment facility. The practicality of this technology would depend on the contaminants in the creosote and any potential liability another facility is willing to accept by taking materials from a potential NPL site.

Conclusions

Reuse of creosote is a potentially effective method of disposal at the JW site. Therefore, reuse will be retained for further consideration.

4.5.2 Treatment of Creosote

Physical/Chemical Treatment Processes

Physical treatment processes can be used to separate the waste stream by either applying physical force or changing the physical form of the waste, while chemical treatment processes alter the chemical structure of the constituents to produce a waste residue that is less hazardous than the original waste. Further, the altered constituents may be easier to remove from the waste stream. Physical and chemical processes can also be used to immobilize contaminants within the waste material. In addition, physical and chemical treatment technologies are utilized to treat organic hazardous waste that is either non-biodegradable or

resistant to biodegradation. Physical/chemical treatment options that were evaluated for non-aqueous creosote waste at the JW facility are discussed below.

- **Solidification/Stabilization** processes involve mixing waste with a solidifying agent, such as cement, to form an impermeable, stable matrix. Contaminants would be mechanically locked within the solidified matrix, and therefore would be less mobile.
- **Dechlorination** is a treatment process that uses a chemical reaction to replace the chlorine atoms in chlorinated aromatic molecules (such as PCP, dioxins, and furans) with an ether or hydroxyl group. By stripping the chlorine atoms, the toxicity of the chlorinated aromatic compounds is reduced or eliminated. An evaluation of the end products would be required to determine whether further treatment is required.
- **Chemical Oxidation** is a treatment technology in which chemical compounds are added to oxidize contaminants and liberate free oxygen. Use of elevated temperatures and catalysts can enhance the oxidation process. Partially oxidized products would require further treatment.
- **Heat** is necessary to make the creosote fluid enough to be pumped and treated. Heating will not reduce the concentration or volume of the creosote, and would be necessary for removal of the creosote from the tanks.

Conclusion

Chemical oxidation shows some effectiveness in treating oxidizable contaminants, but has only limited application. The effectiveness of solidification/stabilization for materials with high concentrations of organics is questionable. Therefore, only heat and dechlorination will be retained for non-aqueous creosote wastes.

Thermal Treatment

Thermal treatment methods use high-temperature oxidation under controlled conditions to degrade substances into carbon dioxide, water, hydrogen chloride, sulfur oxides, and ash. Thermal destruction is a proven technology that can effectively treat all organic compounds. Thermal treatment technologies considered for the non-aqueous creosote wastes are described below.

- **Rotary Kiln Incineration** utilizes a long, rotating kiln that is slightly inclined. Wastes and auxiliary fuel are fed into the elevated end of the kiln. The waste material combusts as it passes through the kiln. The kiln is slowly rotated to enhance mixing of the waste with combustion air. Flue gases are passed through an afterburner for further oxidation and are subsequently treated using conventional air pollution control equipment. Ash is removed at the lower end of the kiln. The rotary kiln is the most commonly used incineration method for contaminated soils.
- **Infrared Incineration** uses infrared energy as an auxiliary heat supply for destruction of combustible materials. Materials to be treated are conveyed through a primary combustion chamber, where organics are volatilized and partially combusted. Exhaust gases pass through a secondary chamber to ensure complete combustion of organics, followed by treatment by pollution control equipment.
- **Fluidized-Bed Incineration** uses granular, inert material in a refractory-lined vessel to improve heat transfer to the waste material being incinerated. Air is blown through the material, causing it to mix like a fluid. The high mixing energies aid in the combustion process, resulting in lower operating temperatures than other types of incinerators. Treatment of the incinerator off-gas is required.
- **Pyrolysis** is a high-temperature thermal destruction technology in which destruction of organic materials occurs in the absence of oxygen. The product of pyrolysis is a gas that contains low-molecular weight hydrocarbons, CO₂, H₂, methane, and solid ash material.
- **Thermal Desorption** is used to transfer volatile and semivolatile organic compounds from a solid matrix into a gas stream, typically using air, heat, and mechanical agitation. The organic compounds transferred into the gas stream are then subjected to further treatment (e.g., carbon adsorption or high-temperature incineration).
- **Fuels Blending** can be used to process liquid organics, sludges, and solids into fuel for powering cement kilns. Wastes must meet specifications for chemical content and BTU value. Temperatures and residence times are maintained to achieve EPA-required destruction and removal efficiencies. Residual ash is incorporated into the finished cement product.

Conclusion

All forms of thermal treatment are potentially effective for treating non-aqueous creosote wastes at the JW site. Because of the similarities between thermal treatment options,

two thermal treatment processes have been retained for further analysis as representative options: rotary-kiln incineration and fuels blending.

4.5.3 Removal

The removal of wastes could be accomplished by excavating on-site wastes. Excavation is an effective method for physically removing wastes from the site. Excavation involves the use of standard construction equipment that is adapted to minimize secondary migration. There are no limitations on the types of waste that can be excavated and removed. Factors to be considered while evaluating the usefulness of this technology include an assessment of the mobility of the waste, comparison with the feasibility of *in situ* treatment, and the cost of disposing or treating the waste once it has been excavated.

4.6 TECHNOLOGIES TO ADDRESS ABANDONED TANKS

This removal action will address removal of liquids and decontamination and disposal of aboveground and underground tanks. Removal actions could range from abandonment in place, accompanied by some type of containment, to complete dismantling and removal of the tanks.

4.6.1 Institutional Actions

Access restrictions can be implemented to reduce the potential for humans to enter into the abandoned tanks. Restrictions could include fencing and warning signs. However, these restrictions are now in place and have been ineffective to date.

4.6.2 Containment

The entrances to the above and underground tanks could be sealed, limiting the potential for precipitation to enter the tanks. The use of containment would require long-term maintenance. Containment of ancillary piping for the tanks would be difficult to implement, and may not be a feasible option.

4.6.3 In-Place Abandonment

The underground tanks could be abandoned in place. Abandonment would have to be performed in accordance with federal and state underground storage tank regulations. If soil

underlying the tanks is significantly contaminated, sampling and removal of the soil would be extremely difficult with the tanks remaining in place. In addition, in-place abandonment would result in limitations to future use or development of the facility.

4.6.4 Removal

The storage tanks, associated piping, could be dismantled and removed. Removal of the tanks is readily implementable. Complete removal of the underground tank would allow inspection of the underlying and surrounding soil, some of which is likely to be saturated with creosote and possibly PCP/oil in the buried railcar. Any debris generated from dismantling all of the tanks, and any visibly contaminated soil excavated during tank removal would require proper treatment and/or disposal.

4.6.5 Disposal/Recycling

Debris from the tanks, if sufficiently decontaminated, could be disposed of in a landfill if the debris could meet the appropriate land disposal restrictions. Scrap metal recovered from the tanks, if sufficiently decontaminated, could be transported off site to a metal-recycling facility.

4.7 TECHNOLOGIES TO ADDRESS THE JENNITE PIT

This section addresses the creosote and Jennite present in the Jennite pit. Because of the nature of the materials in the pit, the only removal action technologies include institutional actions, containment, thermal treatment, and physical/chemical treatment.

4.7.1 Institutional Actions

Access restrictions can be implemented to reduce the potential for persons to enter the Jennite pit area. Restrictions could include fencing and warning signs. However, these restrictions are now in place around the perimeter of the site and have been ineffective.

4.7.2 Containment

Sheet piling or slurry walls could be installed around the perimeter of the Jennite pit in an effort to inhibit lateral migration of material in the pit. A low-permeability cap could also be placed over the Jennite pit. Placement of a cap would limit the potential for direct

contact with material in the Jennite Pit, if sloped properly, limit the amount of precipitation contacting the material.

Another containment option would be to remove the material from the Jennite pit and place the material into either lined rolloff boxes or a lined surface impoundment.

Conclusion

The geology in the site area consists mainly of fine sands. Therefore, installation of a slurry wall or sheet piling may be effective in limiting lateral migration of material from the Jennite pit, but would not inhibit the vertical migration of contaminants. Significant materials handling would be required and significant costs incurred in order to place the material into rolloff boxes or a lined surface impoundment. Therefore, containment in rolloff boxes or in a lined surface impoundment will not be retained for further evaluation. Placement of a cap over the Jennite Pit would likely be effective in reducing the potential for direct contact and will be retained.

4.7.3 Physical/Chemical Treatment Processes

Physical treatment processes can be used to separate the waste stream by either applying physical force or changing the physical form of the waste, while chemical treatment processes alter the chemical structure of the constituents to produce a waste residue that is less hazardous than the original waste. Further, the altered constituents may be easier to remove from the waste stream. Physical and chemical processes can also be used to immobilize contaminants within the waste material. In addition, physical and chemical treatment technologies are utilized to treat organic hazardous waste that is either non-biodegradable or resistant to biodegradation. Physical/chemical treatment options that were evaluated for material in the Jennite pit are discussed below.

- **Solidification/Stabilization** processes involve mixing waste with a solidifying agent, such as cement, to form an impermeable, stable matrix. Contaminants would be mechanically locked within the solidified matrix, and therefore would be less mobile.
- **Dechlorination** is a treatment process that uses a chemical reaction to replace the chlorine atoms in chlorinated aromatic molecules (such as PCP, dioxins, and furans) with an ether or hydroxyl group. By stripping the chlorine atoms, the toxicity of the chlorinated aromatic compounds is reduced or eliminated. An evaluation of the end

products would be required to determine whether further treatment is required.

- **Chemical Oxidation** is a treatment technology in which chemical compounds are added to oxidize contaminants and liberate free oxygen. Use of elevated temperatures and catalysts can enhance the oxidation process. Partially oxidized products would require further treatment.

Conclusion

Chemical oxidation shows some effectiveness in treating oxidizable contaminants, but has only limited application. The effectiveness of solidification/stabilization for materials with high concentrations of organics is questionable. Therefore, only dechlorination will be retained for material in the Jennite pit.

Thermal Treatment

Thermal treatment methods use high-temperature oxidation under controlled conditions to degrade substances into carbon dioxide, water, hydrogen chloride, sulfur oxides, and ash. Thermal destruction is a proven technology that can effectively treat all organic compounds. Thermal treatment technologies considered for the material in the Jennite pit are described below.

- **Rotary Kiln Incineration** utilizes a long, rotating kiln that is slightly inclined. Wastes and auxiliary fuel are fed into the elevated end of the kiln. The waste material combusts as it passes through the kiln. The kiln is slowly rotated to enhance mixing of the waste with combustion air. Flue gases are passed through an afterburner for further oxidation and are subsequently treated using conventional air pollution control equipment. Ash is removed at the lower end of the kiln. The rotary kiln is the most commonly used incineration method for contaminated soils.
- **Infrared Incineration** uses infrared energy as an auxiliary heat supply for destruction of combustible materials. Materials to be treated are conveyed through a primary combustion chamber, where organics are volatilized and partially combusted. Exhaust gases pass through a secondary chamber to ensure complete combustion of organics, followed by treatment by pollution control equipment.
- **Fluidized-Bed Incineration** uses granular, inert material in a refractory-lined vessel to improve heat transfer to the waste material

being incinerated. Air is blown through the material, causing it to mix like a fluid. The high mixing energies aid in the combustion process, resulting in lower operating temperatures than other types of incinerators. Treatment of the incinerator off-gas is required.

- **Pyrolysis** is a high-temperature thermal destruction technology in which destruction of organic materials occurs in the absence of oxygen. The product of pyrolysis is a gas that contains low-molecular weight hydrocarbons, CO₂, H₂, methane, and solid ash material.
- **Thermal Desorption** is used to transfer volatile and semivolatile organic compounds from a solid matrix into a gas stream, typically using air, heat, and mechanical agitation. The organic compounds transferred into the gas stream are then subjected to further treatment (e.g., carbon adsorption or high-temperature incineration).
- **Fuels Blending** can be used to process liquid organics, sludges, and solids into fuel for powering cement kilns. Wastes must meet specifications for chemical content and BTU value. Temperatures and residence times are maintained to achieve EPA-required destruction and removal efficiencies. Residual ash is incorporated into the finished cement product.

Conclusion

All forms of thermal treatment are potentially effective for treating non-aqueous creosote wastes at the JW site. Because of the similarities between thermal treatment options, two thermal treatment processes have been retained for further analysis as representative options: rotary-kiln incineration and fuels blending.

Table 4-1

EVALUATION OF PROCESS OPTIONS FOR CONTAMINATED SOIL

Remedial Technology	Technology	Process Options	Effectiveness	Implementability	Cost	Retained for Further Evaluation?
Institutional Actions	Access Restrictions	Deed Restrictions/fencing	Does not reduce contamination; may reduce the potential for exposure to contaminated soils.	Legal requirements and authority must be established.	Very low	Yes
Containment	Cap	Multimedia Cap	Does not reduce contamination; is not effective for wastes below the water table.	Simple construction; affects future land use.	Moderate capital, moderate O&M	Yes
	Vertical Barriers	Slurry walls/sheet piling/grout curtain	Does not reduce contamination; effective in preventing lateral migration. Does not prevent vertical migration.	Simple construction, affects future land use.	Moderate-high capital, low O&M	No
	Horizontal Barriers	Grout Injection	Does not reduce contamination; conventional grout technology cannot produce a reliable impermeable horizontal barrier.	Few horizontal barriers have been constructed; may not be commercially available.	Moderate-high capital	No
Removal	Excavation	Soil Excavation	Effective and reliable; commonly used.	Relatively simple to implement; may require dewatering and dust control; may be difficult to implement around tanks.	Low capital	Yes
Treatment	Physical/Chemical Treatment	Stabilization/Solidification	Not effective for high concentration organics.	Relatively simple to implement; treated material would require disposal in a secure facility; treatability testing would be required; dust control would be required.	Low capital; moderate O&M	No

Table 4-1

EVALUATION OF PROCESS OPTIONS FOR CONTAMINATED SOIL

Remedial Technology	Technology	Process Options	Effectiveness	Implementability	Cost	Retained for Further Evaluation?
Treatment (Cont.)	Physical/Chemical Treatment (Cont.)	Soil Washing	Effective in removing inorganics and organics from coarse soil fraction. Fine soil and wash solution require further treatment.	Washing systems are commercially available. Treatability testing would be required; dust control would be required.	Moderate capital, moderate to high O&M.	No
		Dechlorination	Effective only for dioxin/furan/PCB and halogenated phenol/creosol groups.	Dechlorination units are commercially available. Treatability testing would be required. Air emission/dust control would be required.	Moderate capital; moderate to high O&M.	Yes
		Chemical Oxidation	Effectively treats oxidizable contaminants in slurried soil or sludge; partially oxidized products may require further treatment. Not effective for dioxins/furans.	Application in environmental remediation is limited. Air emission/dust control would be required.	Unknown	No
		Acid Extraction	Effective only for metals in soil; liquid component may require further treatment. Not effective for organics.	Extraction systems are commercially available. Treatability testing would be required. Air emission/dust control would be required.	Moderate capital, moderate-high O&M.	No
		Solvent extraction	Effective in removing organics from soil. Liquid component may require further treatment.	Extraction systems are commercially available. Treatability testing would be required. Air emission/dust control would be required.	Moderate capital, moderate to high O&M	No

Table 4-1

EVALUATION OF PROCESS OPTIONS FOR CONTAMINATED SOIL

Remedial Technology	Technology	Process Options	Effectiveness	Implementability	Cost	Retained for Further Evaluation?
Treatment (Cont.)	Thermal Treatment	Incineration (rotary kiln)	Effective for organics.	Incinerators are commercially available; permitting would be required. Air emission/dust control would be required.	High capital, moderate O&M	Yes
		Incineration (infrared)	Effective for organics.	Mobile and stationary systems are commercially available; permitting would be required. Air emission/dust control would be required.	High capital, moderate O&M	No
		Incineration (fluidized-bed)	Effective for organics.	Mobile fluidized-bed incinerators are commercially available; permitting would be required. Air emission/dust control would be required.	Moderate capital, moderate O&M	No
		Pyrolysis	Effective for organics.	This process is commercially available; permitting would be required. Air emission/dust control would be required.	Moderate capital, moderate O&M	No
		Thermal desorption	Effective for organics.	Permitting would be required; treatability testing would be recommended. Air emission/dust control would be required.	Moderate capital; moderate O&M	No
		Fuels blending	Effective for non-halogenated organics.	Fuels-blending facilities are commercially available.	Moderate capital	Yes

Table 4-1
EVALUATION OF PROCESS OPTIONS FOR CONTAMINATED SOIL

Remedial Technology	Technology	Process Options	Effectiveness	Implementability	Cost	Retained for Further Evaluation?
Treatment (Cont.)	Biological Treatment	Solid- or slurry-phase (<i>ex situ</i>)	Effective for organics; not effective for dioxins.	Technology is commercially available. Air emission/dust control would be required.	Low to moderate capital, low O&M	No
	Biological Treatment (Cont.)	Landfarming	Effective for organics; not effective for dioxins.	Creation of an on-site facility would be difficult due to nearby residents.	Low to moderate capital, low O&M	No
	<i>In situ</i> treatment	Soil Flushing (<i>in situ</i>)	Effective in flushing inorganics and organics from soil. Wastewater sludge and solids require further treatment.	No barriers to implementation; treatability testing would be required.	Moderate capital; moderate O&M	No
		Vitrification (<i>in situ</i>)	Effective in treating organics and nonvolatile organics in soil.	Vitrification has not yet been used to remediate a Superfund site. Treatability testing is recommended. Air emission control would be required.	Moderate to high capital, high O&M	No
		Steam Injection (<i>in situ</i>)	Ineffective for dioxin.	Limited number of commercial systems available; permitting would be required.	Moderate capital; moderate O&M	No
		Vapor Extraction	Effective in removing heterocyclics, simple nonhalogenated aromatics and polynuclear aromatics. Potentially effective in removing halogenated phenols.	This process is commercially available.	Moderate capital; moderate O&M	No
		<i>In situ</i> Biotreatment	Ineffective for dioxins. Effective in removing PAHs.	Process is commercially available, permitting would be required.	Low capital, low O&M	No

Table 4-1

EVALUATION OF PROCESS OPTIONS FOR CONTAMINATED SOIL

Remedial Technology	Technology	Process Options	Effectiveness	Implementability	Cost	Retained for Further Evaluation?
Disposal	Off-Site Disposal	Landfill (off site)	Disposal in a commercial facility would be protective of human health.	Would require securing a disposal facility capable of accepting the soil. Transportation of soil required. Dust control would be required.	Moderate-high capital	Yes
	On-Site Disposal	Landfill (on site)	Design must be protective of human health and the environment.	Construction of an on-site facility that meets RCRA and/or state requirements could be difficult due to the presence of nearby residences.	Moderate-high capital, low O&M	No
		Backfill (on site)	Effective provided health-based treatment levels are achieved.	May impede future remedial actions; dust control would be required.	Low capital, low O&M	No

Table 4-2

EVALUATION OF PROCESS OPTIONS FOR AQUEOUS WASTES

Remedial Technology	Technology	Process Options	Effectiveness	Implementability	Cost	Retained for Further Evaluation?
Institutional Actions	Access Restrictions	Deed Restrictions	Does not reduce contamination; effectiveness depends upon administrative implementation.	Legal requirements and authority must be established.	Very low	Yes
Treatment	Physical/Chemical Treatment	Sedimentation	Effective in removing precipitates and/or solids from wastewater.	Easily implementable.	Low capital, moderate O&M	Yes
		Filtration	Effective means of removing low levels of suspended solids.	Readily available and easy to control.	Low to moderate capital, low O&M	Yes
		Reverse Osmosis/ Ultrafiltration	Effective in the removal of dissolved solids.	Requires extensive pretreatment to avoid fouling, susceptible to chemical attack.	Moderate to high capital; moderate-high O&M	No
		Oil/Water Separation	Generally effective in removing immiscible liquids with sufficiently different densities (e.g., oil and water).	Easily implementable.	Low capital; low O&M	Yes
		Precipitation	Not effective on organic wastes.	Easily implementable; requires solids disposal.	Low to moderate capital, moderate O&M	Yes
		Ion Exchange	Not effective in removal of organics.	Easily implementable and widely available.	Moderate capital, moderate O&M	No
		Chemical Reduction	Not effective for organics.	Conventional process with no barriers to its implementability.	Low to moderate capital, low to moderate O&M	No

Table 4-2

EVALUATION OF PROCESS OPTIONS FOR AQUEOUS WASTES

Remedial Technology	Technology	Process Options	Effectiveness	Implementability	Cost	Retained for Further Evaluation?
Treatment (Cont.)	Physical/Chemical Treatment (Cont.)	Chemical Oxidation	Effective in treating oxidizable contaminants.	Easily implementable; air emission control would be required.	Moderate capital, moderate O&M	No
		Ultraviolet Oxidation	Effective in treating oxidizable contaminants.	Commercially available; air emission control would be required.	High capital, moderate O&M	No
		Carbon Adsorption	Effective in removing low solubility organics, spent carbon would require treatment/disposal.	Conventional and easily implemented; air emission control would be required.	Low to moderate capital, moderate O&M	Yes
		Dechlorination	Potentially effective in treating dioxins, PCP.	Commercial availability may be limited; air emission control would be required.	Unknown	No
		Neutralization	Would not treat contaminants, but is effective in altering pH.	Easily implemented.	Low to moderate capital, low to moderate O&M	Yes
	Biological Treatment	Fixed-film bioreactor	Effective in remediating organics if proper microbes are developed.	Construction of treatment system; disposal required; air emission control would be required.	Moderate capital, low to moderate O&M	No
	Biological Treatment (Cont.)	Activated sludge	Effective in remediating organics.	Construction of treatment system; solids disposal required; treatability testing required; air emission control would be required.	High capital, high O&M	No

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Table 4-2

EVALUATION OF PROCESS OPTIONS FOR AQUEOUS WASTES

Remedial Technology	Technology	Process Options	Effectiveness	Implementability	Cost	Retained for Further Evaluation?
Treatment (Cont.)	Thermal	Incineration	Effective in removing organics; extremely costly for the treatment offered.	Requires use of large amounts of auxiliary fuels to oxidize organics in the wastewater; air emission control would be required.	High capital, high O&M	No
Disposal	Not applicable	Discharge to POTW	Effective assuming POTW acceptance of treated wastewater.	Readily implemented, permit required.	Moderate capital, low O&M	Yes
		Deep well injection	Effective for disposing of treated groundwater.	Unfavorable regulatory conditions.	Moderate capital, low O&M	No
		Discharge to surface waters	Effective and reliable.	NPDES permitting.	Moderate to high capital, low O&M	No

Table 4-3
EVALUATION OF PROCESS OPTIONS FOR NON-AQUEOUS CREOSOTE WASTES

Remedial Technology	Technology	Process Options	Effectiveness	Implementability	Cost	Retained for Further Evaluation?
Recycling	Recovery	Reuse	Effective and reliable; commonly used.	Simple to implement if a buyer can be found.	Low	Yes
Treatment	Physical/Chemical Treatment	Chemical oxidation	Effectively treats oxidizable contaminants in sludge; partially oxidized products may require further treatment.	Application in environmental remediation is limited. Air emissions/dust control would be required.	Unknown	No
		Solidification/stabilization	Ability to effectively stabilize high-concentration organics is questionable.	Implementable; air emissions/dust control would be required.	Moderate capital and O&M	No
		Dechlorination	Effective only for dioxin/furan/PCB and halogenated phenol/cresol groups.	Dechlorination units are commercially available. Treatability testing would be required. Air emission/dust control would be required.	Moderate capital; moderate to high O&M.	Yes.
	Thermal Treatment	Incineration (rotary kiln)	Effective for organics.	Incinerators are commercially available; permitting would be required. Air emissions/dust control would be required.	High capital; moderate O&M.	Yes
		Incineration (infrared)	Effective for organics.	Mobile and stationary systems are commercially available; permitting would be required. Air emissions/dust control would be required.	High capital; moderate O&M.	No

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Table 4-3

EVALUATION OF PROCESS OPTIONS FOR NON-AQUEOUS CREOSOTE WASTES

Remedial Technology	Technology	Process Options	Effectiveness	Implementability	Cost	Retained for Further Evaluation?
Treatment (Cont.)	Thermal Treatment (Cont.)	Incineration (Fluidized-bed)	Effective for organics.	Mobile fluidized-bed incinerators are commercially available; permitting would be required. Air emissions/dust control would be required.	Moderate capital; moderate O&M.	No
		Pyrolysis	Effective for organics.	This process is commercially available; permitting would be required. Air emissions/dust control would be required.	Moderate capital; moderate O&M.	No
		Thermal desorption	Effective for organics; not effective for metals.	Permitting would be required; treatability testing would be recommended. Air emissions/dust control would be required.	Moderate capital; moderate O&M.	No
		Fuels Blending	Effective for non-halogenated organics.	Fuels-blending facilities are commercially available.	Moderate capital	Yes

Table 4-4
EVALUATION OF PROCESS OPTIONS FOR ABANDONED TANKS

Remedial Technology	Technology	Process Options	Effectiveness	Implementability	Cost	Retained for Further Evaluation?
Institutional Actions	Access Restrictions	Physical barriers	Does not reduce contamination; ineffective to date.	Simple installation	Low capital	Yes
In-Place Abandonment	UST closure	Sand or gravel fill	Effective in closing underground tanks.	Readily implementable; dust control would be required.	Low-moderate capital	No
Removal	Tank Removal	Demolition/Dismantling	Effective in complete removal of any remaining contaminants in vaults.	Readily implementable; dust control would be required.	Moderate capital	Yes
Disposal	Off-site	Landfill (off site)	Effective in removing all debris.	Readily implementable; transportation required; dust control would be required.	Low-moderate capital	Yes
	Recycling	Metal scrap recycling	Effective in disposal of metal debris.	Readily implementable; transportation required; dust control would be required.	Low-moderate capital	Yes

Table 4-5

EVALUATION OF PROCESS OPTIONS FOR THE JENNITE PIT

Remedial Technology	Technology	Process Options	Effectiveness	Implementability	Cost	Retained for Further Evaluation?
Institutional Actions	Access restrictions	Physical barriers	Does not reduce contamination; ineffective to date.	Simple installation	Low capital.	No
Containment	Vertical barriers	Slurry walls/sheet piling/grout curtain	Does not reduce contamination; effective in preventing lateral migration. Does not prevent vertical migration.	Simple construction; affects future land use.	Moderate-high capital, low O&M.	No
	Cap	Multimedia Cap	Does not reduce contamination; is effective and long-lasting in preventing infiltration	Simple construction	Moderate capital, moderate O&M	Yes
	On-site containment	Surface impoundment/rolloff boxes	Does not reduce contamination; effective in preventing migration	Simple construction/implementation.	Moderate capital, low O&M.	No
Treatment	Physical/Chemical Treatment	Solidification/stabilization	Effective in treating organics is questionable	Relatively simple to implement; treated material would require disposal in a secure facility; treatability testing would be required; dust control would be required.	Low capital; moderate O&M.	No
		Dechlorination	Effective only for dioxin/furan/PCB and halogenated phenol/cresol groups.	Treatability testing would be required. Air emission/dust control would be required.	Moderate capital; moderate to high O&M.	Yes
		Chemical Oxidation	Effectively treats oxidizable contaminants in slurried soil or sludge; partially oxidized products may require further treatment. Not effective for dioxins/furans.	Application in environmental remediation is limited. Air emission/dust control would be required.	Unknown	No

recycled paper

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ecology and environment

Table 4-5

EVALUATION OF PROCESS OPTIONS FOR THE JENNITE PIT

Remedial Technology	Technology	Process Options	Effectiveness	Implementability	Cost	Retained for Further Evaluation?
Treatment (Cont.)	Thermal Treatment	Incineration (rotary Kiln)	Effective for organics.	Incinerators are commercially available, permitting would be required. Air emission/dust control would be required.	High capital, moderate O&M.	Yes
		Incineration (infrared)	Effective for organics.	Mobile and stationary systems are commercially available; permitting would be required. Air emission/dust control would be required.	High capital, moderate O&M.	No
		Incineration (fluidized-bed)	Effective for organics.	Mobile fluidized-bed incinerators are commercially available; permitting would be required. Air emission/dust control would be required.	Moderate capital, moderate O&M.	No
		Pyrolysis	Effective for organics.	This process is commercially available; permitting would be required. Air emission/dust control would be required.	Moderate capital, moderate O&M.	No
		Thermal desorption	Effective for organics.	Permitting would be required; treatability testing would be recommended. Air emission/dust control would be required.	Moderate capital; moderate O&M.	No
		Fuels blending	Effective for non-halogenated organics.	Fuels-blending facilities are commercially available.	Moderate capital.	Yes

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5. ANALYSIS OF PROPOSED REMOVAL ACTION ALTERNATIVES

In this section, removal action alternatives are developed to address each contaminated media. Removal action alternatives were developed using the removal action technologies that were retained as a result of the technology evaluation in Section 4. Each alternative is evaluated with respect to the effectiveness, implementability, and cost criteria that were described in Section 4.1. This evaluation takes into account the volumes and areas of media to be addressed. Following the individual analyses of alternatives, a comparative analysis is performed for each media, using the same evaluation criteria of effectiveness, implementability, and cost.

5.1 SOIL REMOVAL ACTION ALTERNATIVES

The following alternatives have been developed to address grossly contaminated soils at the JW site.

5.1.1 Alternative 1: Fencing and Capping

5.1.1.1 Description

This alternative consists of fencing and capping. Under this alternative and all soil alternatives, fencing would be installed around the contaminated soil currently outside the site fence, to the northeast. Fencing would consist of approximately 800 linear feet of 6-foot tall galvanized chain link fence. The fence would limit access to the contaminated area extending northeast from the site along the rail tracks.

Under this alternative, a cap would be placed over all grossly-contaminated areas in the immediate vicinity of the storage tanks to restrict access and limit the infiltration of precipitation through these soils.

5.1.1.2 Analysis

Effectiveness

While the fence and cap would effectively limit access to contaminated areas, this alternative alone would not satisfy the removal action objectives. This alternative would not address contaminated soil in drums and in the cutoff tanks. Gross surficial soil contamination would remain on-site around the storage tanks, and even with cap placement, future migration of contaminants would be possible. This alternative should not negatively impact human health or the environment during the construction or implementation phases provided proper health and safety procedures are followed.

Implementability

Technically, fence installation and cap installation would pose no significant difficulties. However, special procedures would be required to ensure that the cap was sealed to any structures (e.g., tanks) remaining on site. The placement of a cap would interfere with future remedial activities, including investigation and remediation, and would not be consistent with future site activities that are anticipated to address a much larger area of site soils.

Cost

The cost required to install fencing and a limited clay cap in the immediate vicinity of the storage tanks is estimated to be approximately \$19,000.

5.1.2 Alternative 2: Fencing, Excavation, Landfilling

5.1.2.1 Description

This alternative includes fencing around contaminated off-site areas (described in Section 5.1.1), excavation of grossly contaminated surface soils around storage tanks, and off-site disposal of contaminated soils in a landfill. It is estimated that under this alternative, 55 cubic yards of soil excavated from around the two 160,000-gallon tanks and beneath the railway tank car, 30 cubic yards of soil currently stored in drums, and 140 cubic yards of soil currently stored in the cutoff tanks would be transported off site to a landfill permitted to accept such wastes.

5.1.2.2 Analysis

Effectiveness

Fencing would effectively limit access to contaminated areas northeast of the site. Excavation of soils and transportation off site would effectively remove the soils from the site, thereby protecting human health by limiting potential exposure to contamination and protecting the surrounding environment by eliminating the potential for contaminant migration from these soils. Landfilling in a permitted facility would control the waste. However, landfilling would not provide a permanent treatment of wastes in the soil. In order to comply with action-specific ARARs (Appendix A), engineering controls (application of water or dust suppressants) would be implemented to prevent a threat to surrounding areas. Monitoring for dust and airborne contaminants would be required as part of the removal.

Implementability

Technically, fence installation, soil excavation, and soil transportation would pose no significant difficulties. However, special procedures may be required to remove soils from cutoff tanks and drums. Excavation of contaminated soils will be limited to the unsaturated zone, since any gross contamination identified beneath the water table could not be readily removed without dewatering and construction supports.

The greatest obstacle to the implementation of this alternative is the willingness of landfills to accept the waste material. Land disposal restrictions may not permit some soils to be landfilled. Dioxin-contaminated soils will not be accepted by landfills. Based on dioxin results for samples collected at the JW site, landfills contacted to date have not been willing to accept this material. In addition, soils characterized as hazardous cannot be landfilled unless treatment standards are met or unless soil is sufficiently treated so that it no longer contains hazardous waste. It is possible that some soils at the site would be acceptable for landfilling while other soils would not be.

Cost

The cost required to install fencing and to excavate, transport, and landfill 225 cubic yards of soil is estimated to be \$135,000. This figure does not include any costs necessary to secure open excavations once contaminated soil is removed. This also assumes that a disposal facility located within 165 miles from the site would be willing to accept the material.

5.1.3 Alternative 3: Fencing, Excavation, Incineration

5.1.3.1 Description

This alternative includes fencing around contaminated off-site areas (described in Section 5.1.1), excavation of approximately 55 cubic yards of contaminated soils near storage tanks (described in Section 5.1.2), and off-site incineration of approximately 225 cubic yards of contaminated soils. Contaminated soil removed from the JW site would be transported to a permitted incinerator for thermal destruction.

5.1.3.2 Analysis

Effectiveness

The removal of grossly contaminated soils from the site and subsequent treatment would be protective of human health by eliminating the potential for exposure to contaminants in removed soils. The removal of these significant source areas would also be protective of the surrounding environment by eliminating the potential for contaminant migration from these sources. Incineration of soils would provide permanent treatment of the soils. Incineration has been proven effective for destroying organic contaminants in soil. In order to comply with action specific ARARs (Appendix A), engineering controls (application of water or dust suppressants) would be used during implementation of the removal action to minimize any threat to surrounding areas. Monitoring for dust and airborne contaminants would be required as part of the removal.

Implementability

Technically, fence installation, excavation, and incineration would pose no significant difficulties. However, soils containing PCP, and potentially dioxin, may not be accepted by most incineration facilities. Any such soils would have to be transported to the one incinerator that is currently permitted to burn dioxin-containing materials, which is located in Coffeyville, Kansas.

Cost

The cost required to install fencing and to excavate, transport, and incinerate soils at a typical incinerator under this alternative is estimated to be \$420,000. However, since the material contains PCP and dioxins, the material may have to be shipped to the Aptus facility

in Kansas for incineration. Therefore, the estimated cost for this alternative is \$1,870,000. If the soil stored in the cutoff tanks were allowed to remain on-site until a later remedial action, the cost for incinerating the remaining 85 cubic yards of soil (from around the tanks and from the drums) at the Aptus facility would be \$765,000.

5.1.4 Alternative 4: Fencing, Excavation, Dechlorination, Fuels Blending

5.1.4.1 Description

This alternative includes fencing around contaminated off-site areas (described in Section 5.1.1), excavation of 55 cubic yards of soils (described in Section 5.1.2), dechlorination of soils (if necessary), and fuels blending of 225 cubic yards of soil from around storage tanks and from the cutoff tanks and drums. Dechlorination would be implemented on site if soils were determined to contain dioxin or PCP. Soils would then be transported to a RCRA-approved facility for fuels blending/processing.

5.1.4.2 Analysis

Effectiveness

This alternative would provide a similar level of protection to human health and the environment as provided under Alternative 3, by removing grossly contaminated soils from the site. Dechlorination would probably reduce PCP and dioxin concentrations to levels at which waste would be acceptable to a fuels blending facility. Fuels blending would provide an effective method of treating the soil, destroying organic contaminants. In order to comply with action specific ARARs (Appendix A), engineering controls (application of water or dust suppressants) would be used during implementation of the removal action to minimize any threat to surrounding areas. Monitoring for dust and airborne contaminants would be required as part of the removal. Treatment by dechlorination is subject to RCRA regulations for tanks in 40 CFR 264 Subpart J.

Implementability

Dechlorination would require on-site treatment of soils. Such a treatment system would require adequate space in an area of the site that is not contaminated. The construction of a concrete pad, which would serve as containment for the dechlorination process, may be required. There are few vendors capable of supplying dechlorination systems for soil.

Treatability testing would be required to develop a system for the JW site and to ensure that the system would be effective.

Cost

The cost required to install fencing and to excavate, dechlorinate, and fuels-blend soils is estimated to be \$320,000.

5.1.5 Comparative Analysis of Soils Alternatives

The removal action alternatives for soil are herein contrasted against each other with respect to the criteria of effectiveness, implementability, and cost.

Effectiveness

Alternative 1 would provide the least amount of protection to human health and the environment, because gross contamination would remain on site. Alternative 1 would not meet the removal objectives. Alternatives 2, 3, and 4 would effectively remove grossly-contaminated soils from the site. Alternatives 3 and 4 provide greater long-term protection to the environment by destroying organic contaminants, while under Alternative 2 contaminants would remain untreated, albeit in the controlled environment of a landfill.

Implementability

Alternative 1 would significantly impact any future remedial actions at the site. Alternative 2 will only be implementable if waste materials are acceptable to landfills. Alternative 3 is implementable, although some material may have to go to the rotary-kiln incinerator operated by Aptus, Inc., in Coffeyville, Kansas, if PCP and dioxin are problematic. Alternative 4 is limited by the lack of available vendors providing dechlorination of soils, and would require treatability testing.

Cost

The cost to implement each alternative is estimated to be:

- Alternative 1: \$19,000.
- Alternative 2: \$135,000.

- Alternative 3: \$765,000.
- Alternative 4: \$320,000.

5.2 AQUEOUS WASTE REMOVAL ACTION ALTERNATIVES

The following alternatives have been developed to address liquid wastes that are primarily aqueous in nature. Because different technologies are applicable for aqueous wastes versus nonaqueous waste, and because some waste materials will contain both aqueous and nonaqueous phases, the phases will need to be separated. Therefore, all aqueous waste removal alternatives will include oil/water separation prior to any further treatment or disposal. Following this separation, the nonaqueous phase (oils and sludges) would be treated in the same manner as the creosote wastes discussed in Section 5.3. The alternatives and costs provided below only address the aqueous phase.

5.2.1 Alternative 1: Oil/Water Separation, On-Site Carbon Adsorption, Off-Site Disposal of Water

5.2.1.1 Description

This alternative consists of oil/water separation, followed by transportation of aqueous wastes to an off-site facility (i.e., wastewater treatment plant). Aqueous wastes would be pumped from the storage tanks or drums, separated from the oil phase, run through an on-site carbon adsorption unit, and pumped into licensed waste-hauling trucks. The trucks would transport the aqueous wastes to the wastewater treatment facility, where the liquids would receive final treatment.

5.2.1.2 Analysis

Effectiveness

Removal of aqueous wastes from the site will eliminate the potential for human exposure to contaminants in the water and will minimize the potential for the water to migrate, via spills or leaks, to the environment. Oil/water separation should be effective in separating primarily aqueous liquids from non-aqueous liquids. On-site carbon adsorption would effectively remove organic contaminants to a level that meets pretreatment standards for a treatment facility. Final treatment of aqueous wastes at a wastewater treatment facility

would provide permanent treatment of the water prior to discharge. Wastewater treatment facilities are designed to provide sufficient treatment of organic and inorganic contaminants, so that the environment is not impacted by discharge from the facility, as long as influent streams comply with the facility's pretreatment standard. In order to comply with action-specific ARARs (Appendix A), residues from aqueous waste treatment (e.g., spent carbon) may have to be managed as hazardous waste.

Implementability

Oil/water separation, carbon adsorption, and disposal of aqueous wastes at a wastewater treatment facility would pose no significant technical difficulties, as long as the treatment facility's pretreatment standards are met. Hauling of treated water via trucks would have to be scheduled to accommodate the flow rate generated by on-site removal and pre-treatment activities.

Cost

The cost required to separate, treat, collect, transport, and dispose of aqueous wastes is estimated to be approximately \$15,000.

5.2.2 Alternative 2: Oil/Water Separation, On-Site Carbon Adsorption, Discharge to Sewer

5.2.2.1 Description

Aqueous wastes would be pumped from the storage tanks or drums, separated from the oil phase, run through an on-site carbon unit, and pumped directly into a nearby sewer system, eventually flowing to the local wastewater treatment plant.

5.2.2.2 Analysis

Effectiveness

Removal of aqueous wastes under this alternative will achieve a similar level of protection to human health and the environment as that achieved under Alternative 1. Oil/water separation should be effective in separating primarily aqueous liquids from non-aqueous liquids. On-site carbon adsorption would effectively remove organic contaminants to a level that meets pretreatment standards for a treatment facility. Discharge of pre-treated

water to a wastewater treatment facility would provide permanent treatment of water. Wastewater treatment facilities are designed to provide sufficient treatment of organic and inorganic contaminants, as long as influent streams comply with the facility's pretreatment standard. In order to comply with action-specific ARARs (Appendix A), residues from aqueous waste treatment (e.g., spent carbon) may have to be managed as hazardous waste.

Implementability

Oil/water separation, carbon adsorption, and disposal of aqueous wastes at a wastewater treatment facility would pose no significant technical difficulties, as long as the treatment facility's pretreatment standards are met. Discharge to a nearby sewer may not be acceptable to the wastewater treatment facility, depending on residual contamination in the water.

Cost

The cost required to separate, pre-treat, and discharge aqueous wastes directly to a sewer is estimated to be approximately \$14,000.

5.2.3 Comparative Analysis of Aqueous Waste Alternatives

The removal action alternatives for aqueous wastes are compared with respect to effectiveness, implementability, and cost in this section.

Effectiveness

Alternatives 1 and 2 would both be effective in meeting removal action objectives by removing aqueous wastes from the site, thereby abating the potential exposure of nearby human populations to hazardous materials within the tanks and minimizing the potential for migration of aqueous wastes via spills or leaks.

Implementability

Alternatives 1 and 2 are both easily implementable, provided aqueous waste meets the pre-treatment standards of the wastewater treatment facility. The wastewater treatment facility may prefer Alternative 1 to allow testing of pre-treated water prior to their acceptance of the aqueous waste. However, Alternative 2 would allow immediate discharge of pre-treated water

to the sewer system. Therefore, under Alternative 2, pre-treated water would not have to be stored on-site until a sufficient volume was available for hauling via truck. Alternative 2 would be easier to implement.

Cost

Alternative 2 is estimated to be slightly less costly than Alternative 1.

5.3 CREOSOTE REMOVAL ACTION ALTERNATIVES

5.3.1 Alternative 1: Incineration

5.3.1.1 Description

Creosote (approximately 25,500 gallons of free product and sludge) would be transferred from the storage vessels to vehicles permitted to transport hazardous materials. The permitted vehicles would then transport the material to a RCRA-approved off-site incinerator. The creosote would be incinerated, allowing for complete destruction of all hazardous organic constituents.

5.3.1.2 Analysis

Effectiveness

Utilization of this alternative would be protective of human health by eliminating potential exposure of nearby human populations to hazardous materials contained in the storage vessels. This alternative would also eliminate hazardous substances in the storage vessels that pose a threat of release to the environment. Incineration is a proven technology that would permanently destroy hazardous organic constituents. This alternative would achieve the remedial action objectives.

Implementability

The tarry nature of the creosote wastes may pose difficulties with materials handling during removal. However, these difficulties can be overcome using special equipment and/or handling procedures (e.g., solvent rinsing or heating). Implementation of this alternative requires the identification of a RCRA-permitted facility willing to accept the material. It is anticipated that the waste would be classified as F034 (wastes generated at plants that use creosote formulations). Local hazardous waste incinerators, such as the Chemical Waste

Management (CWM) incinerator located in Sauget, Illinois, would likely be able to accept the material (acceptance would be based upon analytical approval) if no significant concentrations of dioxins/furans are present.

However, since the material does contain dioxins/furans, most incineration facilities would be unable to accept the material. Only the Aptus, Inc. incineration facility located in Coffeyville, Kansas is permitted to accept dioxin-containing wastes, and can accept FO34 wastes and FO32 wastes (wastes generated at wood-treating plants that use chlorophenolic formulations).

Cost

According to CWM, incineration rates for this type of material would be highly variable, depending upon several physical and chemical characteristics of the material, including heat content, chloride content, and ash content. Any material that does not contain significant concentrations of dioxins/furans could be sent to a nearby hazardous waste incinerator (such as the CWM facility in Sauget, Illinois) at a cost of \$1.00 per pound. However, for cost-estimating purposes, based on the dioxin analytical results presented in Section 2, it is assumed that all materials would be transported to the Aptus facility for incineration at a cost of \$3.00 per pound. This cost is based on the volume of material; smaller volumes of material would cost up to \$8.00 per pound for incineration at this facility. The total estimated cost for this alternative is \$800,000.

5.3.2 Alternative 2: Dechlorination (if necessary), Fuels Blending

5.3.2.1 Description

Under this alternative, creosote (approximately 25,500 gallons of free product and sludge) would be transferred from the storage tanks and the aboveground rail car to vehicles permitted to transport hazardous materials. Creosote material containing significant concentrations of dioxins/furans would be treated using dechlorination before being transferred into the waste transport vehicle. If dechlorination of creosote material is required, the possibility of utilizing one of the on-site tanks to perform dechlorination would be examined.

Creosote material will be transported off-site to a RCRA-permitted facility for fuels processing/blending. Use of the material as fuel for a cement kiln would allow for complete

destruction of all hazardous organic constituents, and would allow a beneficial use for the material.

5.3.2.2 Analysis

Effectiveness

Removal and off-site fuels blending would protect human health by eliminating potential exposure of nearby human populations to hazardous materials contained in the storage vessels. This alternative would also eliminate hazardous substances in the storage vessels that pose a threat of release to the environment. Air monitoring would be required if dechlorination is implemented on-site. Use of the material as cement-kiln fuel would effectively eliminate all hazardous organic constituents. Treatment by dechlorination is subject to RCRA regulations for tanks in 40 CFR 264 Subpart J. Dechlorination has not been successfully applied to this great of a volume of material to treat dioxins.

Implementability

Handling of the creosote wastes during removal may be difficult, due to the tarry nature of the wastes, as discussed for Alternative 1. Implementation of Alternative 2 requires the identification of a RCRA-permitted fuels-blending facility. Missouri Fuel Recycler, Inc. (MFR) of Hannibal, Missouri, is a RCRA-permitted facility which processes a range of hazardous and non-hazardous wastes for reuse as cement-kiln fuel. MFR has indicated that it may be willing to accept the creosote waste material if it can be shipped in bulk form and does not contain significant concentrations of dioxins/furans (acceptance would be based upon analytical approval). Dechlorination would require a treatability study, which would take two to three months to complete. Mobile dechlorination systems are not in common use and would not be readily available.

Cost

According to MFR, fuels blending rates for this type of material would be highly variable, depending upon characteristics of the material, including heat content, chloride content, lead content, and solids and water content for liquid fuels. Fuels blending for solids is estimated to cost approximately \$450 per ton, while liquid costs would range from

approximately \$0.50 - \$0.82 per gallon. Dechlorination is estimated to cost between \$250 and \$500 per ton.

Assuming this alternative would require dechlorination of all 25,500 gallons of material, and fuels blending of 16,000 gallons of liquid and 9,500 gallons of solids, this alternative would cost approximately \$240,000, assuming a dechlorination treatability study would cost \$50,000.

5.3.3 Alternative 3: Recycling/Reuse

5.3.3.1 Description

Under this alternative, creosote (approximately 25,500 gallons of free product and sludge) would be transferred from the storage vessels to vehicles permitted to transport hazardous materials. The permitted vehicles would then transport the material to a facility willing to accept the material for recycling/reuse.

5.3.3.2 Analysis

Effectiveness

Removal of the material from the site, as under Alternatives 1 and 2, would achieve the removal action objectives, and would protect human health by eliminating potential exposure of nearby human populations to hazardous materials contained in the storage vessels. This alternative would also eliminate hazardous substances in the storage vessels that pose a threat of release to the environment. Recycling/reuse of the material would have to be in a manner which is protective of human health and the environment, but would be a beneficial use for the material, which is preferable to disposal or treatment.

Implementability

As discussed for Alternatives 1 and 2, materials handling may pose difficulties, but these difficulties can be overcome. Implementation of Alternative 3 would require the identification of a facility willing to accept the waste creosote material. The American Wood Preserving Institute has been contacted in an attempt to identify facilities that may be interested in obtaining the creosote material. Thus far, a facility willing to accept the material has not been identified. Based on the condition of the material and the dioxin/furan results for this material, it is anticipated that only the approximately 12,000 gallons of oil in the east

160,000-gallon tank might be accepted by an active wood-treating facility. Sludges are highly unlikely to be accepted for reuse.

Cost

Costs to implement this alternative cannot be calculated at this time, as a facility willing to accept the material for recycling/reuse has not been identified.

5.3.4 Comparison of Creosote Alternatives

Effectiveness

All creosote alternatives evaluated in this section would be protective of human health by eliminating potential exposure of nearby human populations to hazardous materials contained in the storage vessels. All creosote alternatives would also eliminate hazardous substances in the storage vessels that pose a threat of release to the environment. Proper safety procedures must be observed during implementation of any of these alternatives to ensure that workers are not significantly exposed to contaminants. The more complex materials handling required for dechlorination under Alternative 2 would pose slightly greater risks to workers implementing the removal action.

Implementability

Materials handling difficulties will have to be overcome for any of the three alternatives. Implementation of each alternative would require locating a facility willing to accept the creosote materials. In the case of the Alternatives 1 and 2, facilities likely to accept the material have been identified. However, based on the presence of dioxins, the lack of evidence that dechlorination would be implementable, and the length of time required to conduct treatability studies for dechlorination, Alternative 1 appears to be the most viable option. Alternative 3 is not implementable at this time because a facility willing to accept the creosote material for recycle/reuse has not yet been identified.

Cost

The cost for Alternative 3 cannot be developed at this time. However, should a facility willing to accept the creosote material for recycle/reuse be identified, it is likely that

this alternative would be favorable when compared to Alternatives 1 or 2 on the basis of cost. Alternative 2 is less costly than Alternative 1.

5.4 TANK REMOVAL ACTION ALTERNATIVES

5.4.1 Alternative 1: Decontamination, Dismantling, Off-Site Disposal

5.4.1.1 Description

Following removal of the waste material, the two 160,000-gallon storage tanks, the two railroad cars and the three cutoff tanks will be decontaminated, dismantled and shipped off-site to a permitted facility for disposal. Decontamination fluids will be treated and disposed of in a manner consistent with the other aqueous wastes at the site.

5.4.1.2 Analysis

Effectiveness

Decontamination of the tanks will remove residual contamination and eliminate the potential for human exposure to the contaminants and the potential for contamination to migrate from the tanks via spills or leaks. Dismantling and removal of the storage tanks and railroad cars would eliminate the physical hazards currently posed by the tanks (particularly the instability of the railroad tank car and the improperly covered hole in the ground at the top of the buried rail car). Removal of the tanks would also allow for removal of contaminated soils surrounding the tanks, thereby eliminating high levels of hazardous substances in soils largely at or near the surface that may migrate. Further investigation of soils beneath the tanks could also be more readily implemented after the tanks are removed. Tanks that are dismantled or demolished must be decontaminated and/or disposed of in accordance with RCRA closure requirements.

Implementability

Although special decontamination procedures may be required because of the tarry nature of the creosote waste, this alternative should be readily implementable. Most solid waste disposal facilities will accept scrap metal. Modern Landfill, Belleville, Illinois would likely accept the tanks provided they were cut-up and completely clean (with written verification that they had been properly decontaminated).

Cost

Disposal of decontaminated tanks at Modern Landfill, Belleville, Illinois would cost \$27.50 per ton. Assuming a total mass of 86 tons of scrap metal, disposal of the tanks under this alternative would cost \$2,400. This cost does not include decontamination/dismantling.

5.4.2 Alternative 2: Decontamination, Dismantling, Off-Site Recycling

5.4.2.1 Description

This alternative is similar to Alternative 1, with the exception that the storage tanks and railroad cars would be shipped to a scrap metal recycling facility rather than a disposal facility.

5.4.2.2 Analysis

Effectiveness

This alternative would provide the same level of protection to human health and the environment as provided under Alternative 1, and would be just as effective in meeting the removal action objectives.

Implementability

Although special decontamination procedures may be required because of the tarry nature of the creosote waste, this alternative should be readily implementable. There are numerous scrap yards in the Granite City area. Scrap dealers will generally accept tanks provided they are clean and are sufficiently cut-up, at a minimum, for adequate ventilation.

Cost

Prices that recyclers pay for scrap metal are variable, generally on the order of \$0.01 to \$0.02 per pound. Assuming a return of \$0.01 per pound, recycling of 86 tons of scrap from the tanks and railroad cars would yield a cost benefit of \$1,720.

5.4.3 Comparison of Tank Alternatives

Effectiveness

Both alternatives would be equally effective in eliminating the physical hazards posed by the tanks and removing residual contamination from inside the tanks. The dismantling and

removal of the storage tanks and railroad cars, under both alternatives, would allow for the removal of contaminated soils surrounding the tanks, thereby eliminating high levels of hazardous substances in soils largely at or near the surface that may migrate. Removal of the tanks would also facilitate future investigation and remediation activities for soil beneath the tanks. Recycling of the scrap metal from the tanks would be preferable to landfill disposal.

Implementability

Both alternatives are equally implementable, as either a permitted disposal facility or a scrap metal facility would be required to accept the tanks. These types of facilities have been identified as willing to accept the tanks.

Cost

Alternative 2 is the favored option when compared to Alternative 1. Under Alternative 2, a cost benefit would be realized by selling the scrap metal to a scrap metal facility. In Alternative 1, costs would be incurred by paying to dispose of the tanks in a landfill.

5.5 JENNITE PIT REMOVAL ACTION ALTERNATIVES

The following alternatives have been developed to address contaminated materials in the Jennite pit at the JW site.

5.5.1 Alternative 1: Fencing and Capping

5.5.1.1 Description

This alternative consists of fencing and capping. Under this alternative, fencing would be installed around the Jennite Pit. Fencing would consist of approximately 240 feet of 6-foot tall galvanized chain link fence. The fence would limit access to the contaminated material in the Jennite Pit. In addition, a low-permeability clay cap would be placed over the material in the Jennite pit to reduce the potential for direct contact and to limit the infiltration of precipitation.

5.5.1.2 Analysis

Effectiveness

The fence and cap would effectively limit access to the Jennite pit, thereby reducing potential for human exposure to contaminants and limiting migration of wastes from the pit through seepage. However, this alternative would not satisfy all removal action objectives. Gross contamination would remain on site, and even with cap placement, future migration of contaminants from buried wastes into underlying groundwater would be possible. This alternative should not negatively impact human health or the environment during the construction or implementation phases provided proper health and safety procedures are followed.

Implementability

Technically, fence installation and cap installation would pose no significant difficulties. Special compaction techniques may be required during cap placement because the pit may be physically unstable (i.e., soft). The fence and/or cap may have to be removed during future remedial actions at the site.

Cost

Fence installation and placement of an HDPE liner and a 1 1/2-foot thick clay layer would cost approximately \$11,000.

5.5.2 Alternative 2: Incineration

5.5.2.1 Description

Material from the Jennite pit would be excavated and loaded onto vehicles permitted to transport hazardous materials. The permitted vehicles would then transport the material to a RCRA-approved off-site incinerator. The material would be incinerated, allowing for complete destruction of all hazardous organic constituents.

5.5.2.2 Analysis

Effectiveness

This alternative would protect human health and the environment by removing wastes from the site. Removal of the wastes in the Jennite pit would eliminate potential exposure of nearby human populations to hazardous materials contained in the Jennite pit. This alternative would also eliminate hazardous substances in the Jennite pit that pose a threat of migration. Incineration is a proven technology that would permanently destroy all hazardous organic constituents.

Implementability

Implementation of this alternative requires the identification of a RCRA-permitted facility willing to accept the material. Material classified as F034 (wastes generated at plants that use creosote formulations) that does not contain significant concentrations of dioxins/furans could be transported to a local hazardous waste incinerator (such as the CWM incinerator located in Sauget, Illinois). However, since waste materials in the pit contain dioxins and furans, most incineration facilities would be unable to accept the material. Aptus, Inc., operates an incineration facility located in Coffeyville, Kansas, which is permitted to accept dioxin-containing wastes and wastes classified as F032 (wastes generated at wood-treating plants that use chlorophenolic formulations) or F034.

Because the boundaries of the pit are not well defined, it may be difficult to determine how much material to remove. The large volume of material involved may be more appropriately addressed during later remedial action that also addresses surrounding soils.

Cost

According to CWM, incineration rates for F034 material from this site would be highly variable, depending upon several physical and chemical characteristics of the material, including heat content, chloride content, and ash content. Assuming all material will be sent to the CWM facility in Sauget, Illinois, at a cost of \$1.00 per pound, incineration of the material in the Jennite pit would cost approximately \$9,300,000.

Should some of the material contain dioxin or PCP and not be accepted at the CWM facility in Sauget, Aptus, Inc., has quoted prices of \$3.00 per pound for incineration at the

Coffeyville, Kansas, facility. Assuming all material was sent to Aptus, Inc., incineration of the material in the Jennite Pit would cost approximately \$27,900,000. Costs for incineration at either facility are prohibitively high for a non-time-critical removal action.

5.5.3 Alternative 3: Dechlorination, Fuels Blending

5.5.3.1 Description

Under this alternative, material from the Jennite pit would be transferred to vehicles permitted to transport hazardous materials. Based upon a determination of the contaminants in the material removed from the Jennite pit, material containing chlorinated compounds would be treated using on-site dechlorination. Material would then be transported off site to a RCRA-approved facility for fuels blending. Use of the material as fuel for a cement kiln would allow for complete destruction of all hazardous organic constituents.

5.5.3.2 Analysis

Effectiveness

Removal and off-site fuels blending would provide the same level of protection to human health and the environment as provided by Alternative 2. This alternative would also eliminate the threat of migration of contaminants in the Jennite pit. Air monitoring would be required if dechlorination is implemented on site. The additional materials handling required for dechlorination would slightly increase risks posed to workers implementing the removal action. Dechlorination of this great a volume of dioxin-contaminated soil has never been effectively implemented.

Implementability

Implementation of this alternative requires the identification of a RCRA-permitted fuels-blending facility. MFR of Hannibal, Missouri, is a RCRA-permitted facility that processes a range of hazardous and non-hazardous wastes for reuse as cement-kiln fuel. MFR has indicated that it may be willing to accept material from the Jennite pit (acceptance would be based upon analytical approval). A dechlorination treatability study would be required. Dechlorination equipment is not readily available.

As discussed in Section 5.5.2, the volume of material that would require excavation may be more appropriately addressed during a later remedial action.

Cost

According to MFR, fuels-blending costs would be highly variable, depending upon characteristics of the material, including heat content, chloride content, and lead content.

Fuels blending for solids is estimated to cost approximately \$450 per ton.

On the assumption that this alternative would require dechlorination of approximately 500 cubic yards of material and fuels blending of 3,560 cubic yards of material, dechlorination and fuels blending would cost approximately \$2,400,000.

5.5.4 Comparison of Jennite Pit Alternatives

Effectiveness

Alternatives 2 and 3 would provide a greater level of protection to human health and the environment than Alternative 1, by actually removing Jennite pit waste from the site. Removal of the waste would eliminate health risks posed by direct contact with the wastes and would eliminate the potential for wastes to migrate to surrounding areas. Alternative 1 would be effective in reducing the infiltration of precipitation through the pit and the seepage of wastes to the surface of the pit, and would restrict access to the pit, thereby limiting potential for human exposure to wastes in the pit.

Implementability

Alternative 1 should be readily implementable. Excavation of significant volumes of soil required under Alternatives 2 and 3 may constitute a greater action than is appropriate for a removal action, especially in light of the probability of additional excavation being required in surrounding areas as part of a more comprehensive remedial action. Alternative 3 may be implementable if a dechlorination system that is effective could be developed/constructed for this site. However, treatability testing would be required to determine the viability of dechlorination, and dechlorination treatment systems for soil/solid wastes are not readily available.

Cost

Alternatives 2 and 3 are prohibitively expensive for a non-time-critical removal action.

6. RECOMMENDED REMOVAL ACTION

Based on the comparative analyses of the alternatives presented in Section 5, the recommended action for the JW site is presented below. The estimated time required to complete the removal action is eight weeks. The estimated total cost to implement the removal action is \$2,010,000. Table 6-1 provides detailed costs associated with the removal action.

The components of the recommended removal action include:

- Installation of a 6-foot chain-link fence around the off-site drainage swale impacted by the soil stockpile at the northeast corner of the site;
- Characterization of the material within the drums inside the Transite building;
- Off-site landfilling of 15 drums of ACM contaminated with creosote (assuming no significant dioxin contamination);
- Removal of creosote waste materials and contaminated soil (including approximately 50 gallons of oil and sludge from oil/water separation; 4,000 gallons of oil/tar from the above ground railcar; 1,500 gallons of oil/sludge from the buried railcar; 8,000 gallons of sludge from the west storage tank; 12,000 gallons of oil from the east storage tank; 55 cubic yards of grossly contaminated soil surrounding the two 160,000-gallons tanks and beneath the railway tank car; 30 cubic yards of contaminated soil in drums; and 800 pounds of spent carbon used for treating wastewater) for incineration at an incinerator permitted to burn dioxin-containing wastes;
- Incineration of solids and liquids not containing significant levels of dioxins at a nearby incinerator (cost estimate assumes all materials intended to be incinerated must go to Aptus facility);

- Removal of approximately 27,000 gallons of aqueous waste from the buried railcar (10,500 gallons), the east storage tank (12,000 gallons) and drums (2,000 gallons), and wastewater generated during decontamination of tanks (2,500 gallons), on-site treatment by oil/water separation and carbon adsorption, and off-site disposal at the local wastewater treatment plant;
- Decontamination/dismantling of the storage vessels and railway tank cars and off-site recycling as scrap metal; and
- Installation of a 6-foot chain link fence around the "Jennite" pit and placement of a temporary cap consisting of clay and an HDPE geomembrane over the pit.

Implementation of this removal action will be effective in reducing the potential exposure of nearby human populations to hazardous substances and in eliminating the threat of continued release to the environment posed by highly contaminated source materials in storage vessels and the Jennite pit. This action is recommended because it will result in the removal or securing of identified source areas by restricting site access and removing highly contaminated source materials and grossly contaminated exposed soils from the site.

Optional Removal Action

The action described above was developed taking into consideration a \$2,000,000 spending limit generally imposed on non-time-critical removal actions financed by Superfund. However, if additional funding can be obtained, an optional removal action is recommended. Under this optional action, the removal action described above would be expanded to include the 140 cubic yards of contaminated soil and waste contained in the cutoff tanks. The soil and waste in these tanks would be removed and incinerated off site. The tanks would then be decontaminated, dismantled, and recycled as scrap. Under this revised removal action, the total estimated cost is \$3,290,000.

Another slightly revised version of the removal action for the JW site would consist of recycling oil stored in the east 160,000-gallon storage tank at an active wood-treating facility instead of incinerating it. Efforts to date have not been able to identify a facility willing to accept this material; however, further efforts may identify such a facility and reduce the removal action cost by up to \$300,000.

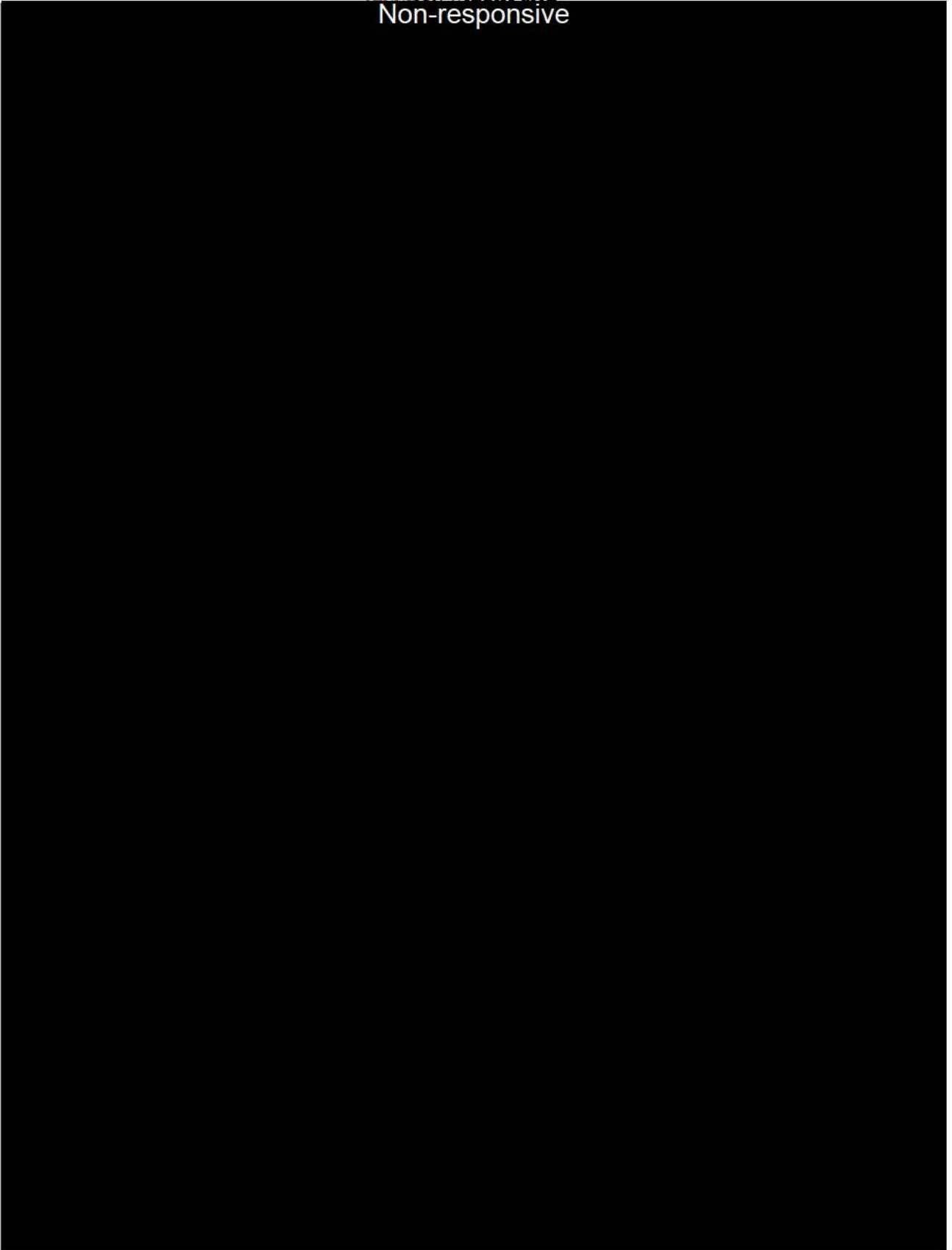
It should be noted that implementation of any of the removal actions described in this report is dependent upon locating treatment facilities willing to accept the waste material associated with this site. Portions of the removal action may have to be reevaluated if treatment facilities are unable/unwilling to accept the waste material. However, at this time it is anticipated that the recommended removal action described above is fully implementable. The cost estimates are based upon the assumptions delineated in Section 5.

Table 6-1

REMOVAL ACTION COST ESTIMATE

JENNISON-WRIGHT SITE

Non-responsive



7. REFERENCES

- Ecology and Environment, Inc., January 18, 1985, *Compliance Investigation Report*.
- Fraumeni, J.F., Jr., Ed. 1975, *Persons At High Risk Of Cancer, An Approach To Cancer Etiology And Control*. New York, NY, Academic Press, Inc.
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- Ruffner, J., and F. Blair, 1985, *Weather of U.S. Cities*, 3rd Edition, Vol. 1, Gale Research Company.
- Woodward-Clyde Consultants, August 1988, *Site Assessment Report, The Jennison-Wright Corp., Granite City, Illinois*.
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- U.S. Department of Health and Human Services, 1985, *Fourth Annual Report on Carcinogens Summary*, Public Health Service, Washington, D.C.
- U.S. Environmental Protection Agency, 1986, "Quality Criteria for Water," Washington, D.C.
- _____, 1991, "Drinking Water Regulations and Health Advisories," Washington, D.C.

APPENDIX A

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

APPENDIX A

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

1. Office of Solid Waste

- Resource Conservation and Recovery Act of 1976 (42 U.S.C. 6901) b/
 - a. 40 CFR Part 264, applicable for permitted facilities c/, and 40 CFR Part 265, for interim status facilities.
 - Groundwater Protection (40 CFR 264.90-264.101)
 - Groundwater Monitoring, Subpart F (40 CFR 264.98-264.100) d/
 - Closure and Post-Closure (40 CFR 264.110-264.120, 265.110-265.120)
 - Containers (40 CFR 264.170-264.178, 265.190-265.177)
 - Tanks (40 CFR 264.190-264.200, 265.190-265.199)
 - Surface Impoundments (40 CFR 264.220-264.249, 265.220-265.230)
 - Waste Piles (40 CFR 264.250-264.269, 265.250-265.258)
 - Land Treatment (40 CFR 264.270-264.299, 265.270-265.282)
 - Incinerators (40 CFR 264.340-264.999, 265.340-265.369)
 - Land Disposal Restrictions (40 CFR 268.1-268.50)
 - b. 40 CFR Part 280, Underground Storage Tank Regulations
 - c. Statutory requirements, including:
 - Liquids in Landfills (RCRA §3004(c))
 - Minimum Technology Requirements (RCRA §3004(o), 3005(j))
 - Dust Suppression (RCRA §3004(e))
 - Hazardous Waste Used as Fuel (RCRA §3004(q))
 - d. Open Dump Criteria - pursuant to RCRA Subtitle D: criteria for classification of solid waste disposal facilities (40 CFR Part 257). Note: For nonhazardous wastes.

2. Office of Water

- The Safe Drinking Water Act (42 U.S.C. 300(f))
 - a. Maximum Contaminant Levels (chemicals, turbidity, and microbiological contamination) (for drinking water or human consumption) (40 CFR 141.11-141.16).
 - b. Maximum Contaminant Level Goals (40 CFR 141.50-141.51, 50 FR 46936).

APPENDIX A

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

- Clean Water Act (33 U.S.C. 1251)
Requirements established pursuant to sections 301 (effluent limitations), 302 (effluent limitations), 303 (water quality standards, including State water quality standards), 304 (Federal water quality criteria), 306 (national performance standards), 307 (toxic and pretreatment standards, including Federal pretreatment standards for discharge into publicly owned treatment works, and numeric standards for toxics), 402 (national pollutant discharge elimination system), 403 (ocean discharge criteria), and 404 (dredged or fill material) of the Clean Water Act, (33 CFR Parts 320-330, 40 CFR Parts 122, 123, 125, 131, 230, 231, 233, 400-469). Available ambient Water Quality Criteria Documents are listed at 45 FR 79318, November 28, 1980; 49 FR 5831, February 15, 1984; 50 FR 30784, July 29, 1985; 51 FR 22978, June 28, 1986; 51 FR 43665, December 3, 1986; 51 FR 8012, March 7, 1986; 52 FR 6213, March 2, 1987.

- EPA's Statement of Procedures on Floodplains Management and Wetlands Protection. (40 CFR Part 6 Appendix A) e/

3. Office of Air and Radiation

- Clean Air Act (42 U.S.C. 7401)
 - a. National Emissions Standards for Hazardous Air Pollutants for Asbestos and Wet Dust particulates, (40 CFR 61.140-61.156), and for other hazardous substances (40 CFR Part 61 generally). See also effluent limitations and pretreatment standards for Wet Dust Collection (40 CFR 427.110-427.116) and 40 CFR Part 763.
 - b. Standards of performance for new stationary sources, including new incinerators (42 U.S.C. 7411), (40 CFR Part 60).

4. Other Federal Requirements

- OSHA requirements for workers engaged in response or other hazardous waste operations (29 CFR 1910.120).
- Occupational Safety and Health Act of 1970 (29 U.S.C. 651).
 - a. Occupational Safety and Health Standards (General Industry Standards) (29 CFR Part 1910).
 - b. The Safety and Health Standards for Federal Service Contracts (29 CFR Part 1926).
 - c. The Health and Safety Standards for Employees engaged in Hazardous Waste Operations. (50 FR 45654).
- Department of Transportation Rules for the Transportation of Hazardous Materials, 49 CFR Parts 107, 171.1-172.558.
- Endangered Species Act of 1973, 16 U.S.C. 1531. (Generally, 50 CFR Parts 81, 225, 402).
- Wild and Scenic Rivers Act, 16 U.S.C. 1271.
- Fish and Wildlife Coordination Act, 16 U.S.C. 661 note.
- Fish and Wildlife Improvement Act of 1978, and Fish and Wildlife Act of 1956, 16 U.S.C. 742a note.
- Fish and Wildlife Conservation Act of 1980, 16 U.S.C. 2901. (Generally, 50 CFR Part 83).

APPENDIX A

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

4. Other Federal Requirements (Cont.)
 - Farmland Protection Policy Act, 7 U.S.C. 4201. (Generally, 7 CFR Part 658).
 - Rivers and Harbors Act (33 U.S.C. 403).
5. State Requirements
 - Title 35: Env. Prot. Act Subtitle B:
 - a. Air Pollution Chapter T: Subchapter C:
 - 35 IAC 212.121-125,
 - 35 IAC 212.421
 - b. Air Pollution Subchapter A:
 - 35 IAC 201.151
 - c. Air Pollution Subparagraph A: Permits
 - 35 IAC 201.141-144,
 - 35 IAC 201.146-147,
 - 35 IAC 201.149,
 - 35 IAC 201.12-165,
 - 35 IAC 201.207-210,
 - 35 IAC 201.261-265,
 - 35 IAC 201.282-283,
 - 35 IAC 201.301-302
 - d. Air Pollution Subchapter C, Emissions Stds. and Limitations for Stationary Sources
 - 35 IAC 212.110,
 - 35 IAC 212.181-185
 - 35 IAC 212.302,
 - 35 IAC 212.304-310,
 - 35 IAC 212.312-315,
 - 35 IAC 212.321-323,
 - 35 IAC 212.361,
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 - 35 IAC 212.422,
 - 35 IAC 212.441,
 - 35 IAC 212.455-457,
 - 35 IAC 212.461-463,
 - 35 IAC 212.681,
 - 35 IAC 215.101-102,

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- Title 35: Env. Prot. Act Subtitle B: (Cont.)
 - d. Air Pollution Subchapter C, Emissions Stds. and Limitations for Stationary Sources (Cont.
 - 35 IAC 215.121-122,
 - 35 IAC 215.141.144,
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 - 35 IAC 231.320,
 - 35 IAC 309.1.1-191
 - e. Air Pollution Subchapter K:
 - 35 IAC 240.103-104,
 - 35 IAC 240.121
 - 35 IAC 243.104-108,
 - 35 IAC 243.121-126
- Title 35: Env. Prot. Subtitle C:
 - a. Water Pollution Subpart B: General Use Water Quality Standards
 - 35 IAC 302.208
 - 35 IAC 302.210
 - 35 IAC 3044.120-126,
 - 35 IAC 3044.201-206,

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- Title 35: Env. Prot. Subtitle C: (Cont.)
 - a. Water Pollution Subpart B: General Use Water Quality Standards (Cont.)
 - 35 IAC 3044.301,
 - 35 IAC 306.201,
 - 35 IAC 306.302-306,
 - 35 IAC 306.401-406,
 - 35 IAC 309.201-282
 - b. Water Pollution Subpart C: Public and Food Processing Water Supply Standards
 - 35 IAC 302.304
 - 35 IAC 304.102-106,
 - 35 IAC 304.141,
 - 35 IAC 305.102-103,
 - 35 IAC 305.306,
 - 35 IAC 305.102,
 - 35 IAC 307.101-105
- Title 35: Env. Prot. Subtitle F:
 - a. Public Water Supplies Subpart B:
 - Chemical and Physical Quality 35 IAC 604.202
 - Public Water Supplies 35 IAC 604.203-204, 605.103
- Title 35 Env. Prot. Act Subtitle G:
 - a. Waste Disposal C:
 - 35 IAC 700.101-504,
 - 35 IAC 702.101-187,
 - 35 IAC 703.101-246,
 - 35 IAC 704.101-203,
 - 35 IAC 705.121-212,
 - 35 IAC 720.101-122,
 - 35 IAC 721.101-133,
 - 35 IAC 722.110-131,
 - 35 IAC 724.101-451,
 - 35 IAC 725.101-530,
 - 35 IAC 726.120-180,
 - 35 IAC 730.101-152 Dept. of Mines and Minerals Rule IIA,
 - 35 IAC 809.101-802,
 - 35 IAC 811

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- Title 35 Env. Prot. Act Subtitle G: (Cont.)
 - b. Sanitary Landfills Subpart E: Closure and Postclosure
 - 35 IAC 807.301-315,
 - 35 IAC 807.318,
 - 35 IAC 807.501-524,
 - 35 IAC 807.600-666
- Title 35 Env. Prot. Act. Subtitle H:
 - a. Noise
 - 35 IAC 902.101,
 - 35 IAC 902.102,
 - 35 IAC 902.120-125,
 - 35 IAC 902.140-141
- Title 92 IL Adm. Code, Transportation Subchapter C:
 - a. Haz. Mat.
 - 92 IAC 171.1-317,
 - 92 IAC 172.1000-2215,
 - 92 IAC 173.2000-3000
- Illinois Water Well Construction Code Law
(Ill. Rev. Stat. 1987 Ch. 111 1/2, pars. 116, 111-118, as amended)
- Illinois Water Well and Pump Installation Contractors Licensing Act
(Ill. Rev. Stat. 1987 Ch. 111, pars. 7101-7130, as amended).
- PA 85-1195 Part I:
Hazardous Waste Crane and Hoisting Equipment Operators Licensing Act (S.H.A. Ch. 11, par. 7701 et seq., as amended)
- I.D.O.T.
Dir. of Highways
Sec. 15 Ill. Vehicle Code Based on Federal Bridge Formulas
- State Field Sampling Procedures

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APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/OTHER FEDERAL AND STATE CRITERIA, ADVISORIES, AND GUIDANCE TO BE CONSIDERED a/1. Federal Criteria, Advisories, and Procedures

- Health Effects Assessments (HEAs) and Proposed HEAs, ("Health Effects Assessment for (Specific Chemicals), "ECAO, USEPA, 1985).
- References Doses (RfDs), ("Verified Reference Doses of USEPA," ECAO-CIN 475, January 1986). See also Drinking Water Equivalent Levels (DWELs), a set of medium-specific drinking water levels derived from RfDs. (See USEPA Health Advisories, Office of Drinking Water, March 31, 1987).
- Carcinogen Potency Factors (CPFs) (e.g., Q1 Stars, Carcinogen Assessment Group [CAG] Values), (Table 11, "Health Assessment Document for Tetrachloroethylene (Perchloroethylene)," USEPA, OHEA/6008 82/005F, July 1985).
- Waste load allocation procedures, EPA Office of Water (40 CFR Part 125, 130).
- Federal Sole Source Aquifer requirements (see 52 FR 6873, March 5, 1987).
- Public health criteria on which the decision to list pollutants as hazardous under Section 112 of the Clean Air Act was based.
- Guidelines for Groundwater Classification under the EPA Groundwater Protection Strategy.
- Advisories issued by PWS and NWPS under the Fish and Wildlife Coordination Act.
- OSHA health and safety standards that may be used to protect public health (non-workplace).
- Health Advisories, EPA Office of Water.
- EPA Water Quality Advisories, EPA Office of Water, Criteria and Standards Division.

2. USEPA RCRA Guidance Documents

- Interim Final Alternate Concentration Limit Guidance Part 1: ACL Policy and Information Requirements (July, 1987)
 - a. EPA's RCRA Design Guidelines
 - b. Permitting Guidance Manuals
 - c. Technical Resource Documents (TRDs)
 - d. Test Methods for Evaluating Solid Waste

3. USEPA Office of Water Guidance Documents

- a. Pretreatment Guidance Documents
- b. Water Quality Guidance Documents
- c. NPDES Guidance Documents
- d. Groundwater/UIC Guidance Documents
- e. Groundwater Protection Strategy (August 1984).
- f. Clean Water Act Guidance Documents

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APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/OTHER FEDERAL AND STATE CRITERIA, ADVISORIES, AND GUIDANCE TO BE CONSIDERED a/

4. USEPA Manuals from the Office of Research and Development
 - SW 846 methods - laboratory analytic methods (November 1986)
 - Lab protocols developed pursuant to Clean Water Act Section 304(h)
5. Nonpromulgated State Advisories
 - State approval of water supply system additions or developments.
 - State groundwater withdrawal approvals.
 - Superfund program groundwater cleanup goals.
 - Recommended allowable drinking water limits.
 - 10^{-5} risk level.

Source: EPA CERCLA COMPLIANCE WITH OTHER LAWS MANUAL; May 6, 1988 (OSWER Directive 9234.1-01).

- a/ This is the list of potentially applicable or relevant and appropriate requirements found in the October 2, 1985, Compliance Policy with additions. As additional requirements are promulgated, they will be considered potentially applicable or relevant and appropriate and added to this list.
- b/ In authorized States, Federal regulations promulgated under RCRA are not applicable as a State requirement until the State adopts those regulations through its own legislative process, but probably would be relevant and appropriate as a federal requirement. Federal regulations promulgated pursuant to the Hazardous and Solid Waste Amendments of 1984, however, are effective immediately in all 50 states, and are potentially applicable as Federal requirements.
- c/ 40 CFR Part 264 regulations apply to permitted facilities and may be relevant and appropriate to other facilities.
- d/ Only Subpart F groundwater monitoring requirements under 40 CFR 264 are ARAR. The Subpart F groundwater monitoring requirements under 40 CFR 265 are not ARAR.
- e/ 40 CFR Part 6 Subpart A sets forth EPA policy for carrying out the provisions of Executive Orders 11988 (Floodplains Management) and 11990 (Protection of Wetlands).

**ADMINISTRATIVE RECORD INDEX
JENNISON-WRIGHT CORPORATION SITE REMOVAL ACTION
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
March 17, 1994**

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), requires the establishment of an Administrative Record upon which the Agency bases its decision when selecting the alternatives for the SACM (Superfund Accelerated Model Program) removal actions.

The Illinois Environmental Protection Agency (IEPA) has compiled the following official Administrative Record Index for the Jennison-Wright Corporation site located in Madison County, Illinois. This index as well as the Administrative Record itself will be updated when necessary by the IEPA. (Definitions of abbreviations are provided on the last page.)

Please contact Michelle Nickey-Tebrugge (P.O. Box 19276, 2200 Churchill Road, Springfield, Illinois 62794-9276, 217/782-6760) for more information on who and where to direct questions concerning this index.

<u>No.</u>	<u>Title</u>	<u>Issue Date</u>	<u>Author</u>	<u>Number of Pages</u>
1.	Compliance Investigation Report	1/18/85	E&E	122
2.	Preliminary Assessment	1/14/86	Kenneth L. Page (IEPA)	8
3.	Consent Decree	1/15/86	IAGO	16
4.	Sample Results	2/10/88	IEPA	27
5.	Alternative Approach Dioxin/Furan Assessment	3/14/88	Woodward-Clyde	62
6.	Sample Results (3 volumes)	3/22/88	ARDL	542
7.	Sample Results (Groundwater) (2 volumes)	3/25/88	Woodward-Clyde	393

<u>No.</u>	<u>Title</u>	<u>Issue Date</u>	<u>Author</u>	<u>Number of Pages</u>
8.	Corr. re: Dioxin	4/15/88	Woodward-Clyde	1
9.	Site Assessment Report	8/88	Woodward-Clyde	575
10.	Memo to Stephen Davis (IEPA)	9/26/88	Tom Long (IDPH)	4
11.	Memo to Stephen Davis (IEPA)	9/26/88	Tom Long (IDPH)	3
12.	Corr.to Pat Petrella (Jennison- Wright)	11/03/88	Thomas Crause (IEPA)	2
13.	Meeting Minutes	11/17/88	Stephen Davis (IEPA)	5
14.	Response to IEPA Comments	11/18/88	Pat P. Petrella (Jennison-Wright)	31
15.	Sample Results	11/30/88	IEPA	69
16.	Sample Results (Inorganic)	11/30/88	IEPA	47
17.	Memo to Div. File	1/20/89	Stephen Davis (IEPA)	2
18.	Sample Results	1/30/89	Triangle Labs	1355
19.	CERCLA Screening Inspection Report (2 volumes)	3/17/89	IEPA	518
20.	Corr. to Stephen Davis (IEPA)	6/07/89	Tom Long (IDPH)	4
21.	Corr. to Stephen Davis (IEPA)	6/23/89	Michael A. Cyphert(Thompson, Hine, & Flory)	2
22.	Corr. to Gregory Dunn (IEPA)	6/23/89	Curtis Ross (USEPA-Region V)	4

<u>No.</u>	<u>Title</u>	<u>Issue Date</u>	<u>Author</u>	<u>Number of Pages</u>
23.	Corr. to Mayor Von Dee Cruse (Granite City)	7/20/89	Virginia Wood (IEPA)	2
24.	Corr. to Ald. Dan Partney (Granite City)	7/20/89	Virginia Wood (IEPA)	2
25.	Corr. to Ald. Dan Brown (Granite City)	7/20/89	Virginia Wood (IEPA)	2
26.	Fact Sheet IEPA	8/89	IEPA	5
27.	News Release IEPA	8/24/89	IEPA	2
28.	Memo to LPC Div. File	9/89	Virginia Wood (IEPA)	2
29.	Corr. to Ald. Daniel Partney (Granite City)	11/09/89	Virginia Wood (IEPA)	2
30.	Corr. to Mayor Von Dee Cruse (Granite City)	11/09/89	Virginia Wood (IEPA)	2
31.	Corr. to Ald. Dan Brown (Granite City)	11/09/89	Virginia Wood (IEPA)	2
32.	Corr. to Stephen Davis (IEPA)	12/14/89	Pat Petrella (Jennison-Wright)	1
33.	Corr. to Ald. Daniel Partney (Granite City)	7/27/90	Virginia Wood (IEPA)	2
34.	Seal Order	11/08/90	Bernard P. Killian (IEPA)	5
35.	News Release	11/19/90	Virginia Wood	1

<u>No.</u>	<u>Title</u>	<u>Issue Date</u>	<u>Author</u>	<u>Number of Pages</u>
36.	Corr. to Beth Halpern (Congressman Jerry Costello)	1991	Stephen Davis (IEPA)	1
37.	Memo to Div. File	5/24/91	Virginia Wood (IEPA)	1
38.	Jennison-Wright Superfund Site Trust Agreement	6/24/91	IEPA	7
39.	Corr. to Stephen Davis (IEPA)	7/06/91	Ald. Dan Partney	1
40.	Corr. to Stephen Davis (IEPA)	7/11/91	Sen. Sam M. Vadalabene	1
41.	Expanded Site Inspection Site Workplan	7/18/91	Tom Crause (IEPA)	14
42.	Corr. to Honorable Sam Vadalabene	7/26/91	Stephen Davis (IEPA)	1
43.	Corr. to Mr. Dan Partney (Ald.) (Granite City)	7/26/91	Stephen Davis (IEPA)	2
44.	CERCLA Expanded Site Inspection Report	7/30/91	IEPA	216
45.	Corr. to Resident	8/14/91	Virginia Wood (IEPA)	1
46.	Sample Results	8/16/91	Dan Gillespie (ARDL)	139
47.	Status of Jennison- Wright Treatment Tests	8/28/91	CDM Federal Programs Corporation	3
48.	Memo to Sherry Otto (IEPA)	10/30/91	Paul Lee (IEPA)	13

<u>No.</u>	<u>Title</u>	<u>Issue Date</u>	<u>Author</u>	<u>Number of Pages</u>
49.	Asbestos Removal Above Ground Storage Tank Cleaning	10/31/91	Riedel	218
50.	News Release	3/25/92	IEPA	2
51.	Corr. to Resident	3/25/92	Lesley D. Morrow (IEPA)	2
52.	Corr. to Stephen Davis (IEPA)	5/14/92	Daniel J. Wilson (Riedel)	36
53.	4(q) Notice	5/15/92	Mary A. Gade (IEPA)	57
54.	Corr. to Stephen Davis (IEPA)	5/27/92	Daniel J. Wilson (Riedel)	4
55.	Final Report by Riedel	6/22/92	Daniel J. Wilson (Riedel)	124
56.	Professional Services Contract/Letter of Agreement Info.	6/29/92	Bill Child (IEPA)	2
57.	Sample Results (2 volumes)	7/07/92	TMS Analytical	1127
58.	Contract Transmittal	7/17/92	Sheila Fite (IEPA)	6
59.	Corr. to Daniel J. Wilson (Riedel)	8/03/92	Stephen Davis (IEPA)	1
60.	Corr. to Dan Sewell (E&E)	9/15/92	Stephen Davis (IEPA)	1
61.	Corr. to Daniel J. Wilson (Riedel)	9/20/92	Stephen Davis (IEPA)	1
62.	Corr. to Stephen Davis (IEPA)	11/04/92	Kathleen Getty (E&E)	1
63.	Memo to Div. File	11/24/92	Greg Dunn (IEPA)	4

<u>No.</u>	<u>Title</u>	<u>Issue Date</u>	<u>Author</u>	<u>Number of Pages</u>
64.	Corr. to Alan Altur (USEPA)	2/03/93	Gregory Dunn (IEPA)	2
65.	Corr. to Brad Benning (USEPA)	2/03/93	Gregory Dunn (IEPA)	2
66.	SACM Status Report to Doug Ballotti (USEPA)	2/03/93	Rebecca Frey (USEPA)	3
67.	Corr. to Rebecca Frey (USEPA)	2/03/93	Gregory Dunn (IEPA)	2
68.	Confidential Investigative Report 1	2/15/93	Orion	301
69.	Corr. to Don Insul (Jennison- Wright Corp.)	3/05/93	Stephen Davis (IEPA)	1
70.	Confidential Investigative Report 2	3/18/93	Orion	103
71.	Paul Seebold Interview	5/03/93	Orion	28
72.	Confidential Investigative Report 3	5/03/93	Orion	366
73.	Corr. to Stephen Davis	5/03/93	Carl Shepherd (Orion)	3
74.	Removal Scope of Work	5/03/93	T.E. Fitzgerald (IEPA)	3
75.	Proposed EE/CA Workplan	6/01/93	E&E	15
76.	Confidential Investigative Report 4	6/03/93	Orion	57

<u>No.</u>	<u>Title</u>	<u>Issue Date</u>	<u>Author</u>	<u>Number of Pages</u>
77.	Corr. to L.E. Spencer (All Track Equip.)	6/03/93	Leslie Morrow (IEPA)	3
78.	Tar Pit Characterization	6/07/93	T.E. Fitzgerald (IEPA)	2
79.	Memo re: Tarpit Investigation	6/09/93	Tracey Fitzgerald (IEPA)	2
80.	Strategy Approval	6/21/93	Jodi Traub (USEPA)	3
81.	Draft Time Line	7/01/93	Rebecca Frey (USEPA)	2
82.	Corr. to Rebecca Frey (USEPA)	7/06/93	Stephen Davis (IEPA)	4
83.	Confidential Investigative Report 5	7/09/93	Orion	98
84.	Corr. to Stephen Davis (IEPA)	7/14/93	Carl Shepard (Orion)	3
85.	EE/CA Comments	8/12/93	Rebecca Frey (USEPA)	3
86.	Last Will and Testament of Carleton G. Carver (Jennison-Wright Corp.)	8/23/93	Orion	92
87.	Corr. to Ald. Daniel Partney (Granite City)	9/14/93	Michelle Nickey-Tebrugge (IEPA)	2
88.	4(q) Notice	9/17/93	IEPA	45
89.	Memo re: Disposal Options to Clarence Smith (IEPA)	9/23/93	Tracey Fitzgerald (IEPA)	1

<u>No.</u>	<u>Title</u>	<u>Issue Date</u>	<u>Author</u>	<u>Number of Pages</u>
90.	Sample Results to Fred Nika (IEPA)	10/7/93	Janel Woodin (ESE)	16
91.	Memo re: Waste Classification to Tracey Fitzgerald (IEPA)	10/26/93	Clarence Smith (IEPA)	2
92.	Sample Results (Tar) to Sue Doubet	10/26/93	Janel Woodin (ESE)	26
93.	Corr. re: 4(q) Status to Leo Konzen (Granite City)	11/12/93	Stephen Davis (IEPA)	2
94.	Memo re: Removal Options to Dan Sewell (E&E)	11/16/93	Fred Nika (IEPA)	2
95.	Decision Summary	12/06/93	Jodi Traub (USEPA)	3
96.	EE/CA Final Draft	1/18/94	E&E	117
97.	Community Relations Plan	2/94	IEPA	19

Abbreviations

IAGO - Illinois Attorney General's Office

Orion - Orion Management International

Riedel - Riedel Environmental Services, Inc.

E & E - Ecology and Environment, Inc.

IEPA - Illinois Environmental Protection Agency

USEPA - United States Environmental Protection Agency

ESE - Environmental Science and Engineering

ARDL - Applied Research and Development Laboratory

Woodward-Clyde - Woodward-Clyde Consultants

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

1. Office of Solid Waste

- Resource Conservation and Recovery Act of 1976 (42 U.S.C. 6901) b/
 - a. 40 CFR Part 264, applicable for permitted facilities c/, and 40 CFR Part 265, for interim status facilities.
 - Groundwater Protection (40 CFR 264.90-264.101)
 - Groundwater Monitoring, Subpart F (40 CFR 264.98-264.100) d/
 - Closure and Post-Closure (40 CFR 264.110-264.120, 265.110-265.120)
 - Containers (40 CFR 264.170-264.178, 265.190-265.177)
 - Tanks (40 CFR 264.190-264.200, 265.190-265.199)
 - Surface Impoundments (40 CFR 264.220-264.249, 265.220-265.230)
 - Waste Piles (40 CFR 264.250-264.269, 265.250-265.258)
 - Land Treatment (40 CFR 264.270-264.299, 265.270-265.282)
 - Incinerators (40 CFR 264.340-264.999, 265.340-265.369)
 - Land Disposal Restrictions (40 CFR 268.1-268.50)
 - b. 40 CFR Part 280, Underground Storage Tank Regulations
 - c. Statutory requirements, including:
 - Liquids in Landfills (RCRA §3004(c))
 - Minimum Technology Requirements (RCRA §3004(o), 3005(j))
 - Dust Suppression (RCRA §3004(e))
 - Hazardous Waste Used as Fuel (RCRA §3004(q))
 - d. Open Dump Criteria - pursuant to RCRA Subtitle D: criteria for classification of solid waste disposal facilities (40 CFR Part 257). Note: For nonhazardous wastes.

2. Office of Water

- The Safe Drinking Water Act (42 U.S.C. 300(f))
 - a. Maximum Contaminant Levels (chemicals, turbidity, and microbiological contamination) (for drinking water or human consumption) (40 CFR 141.11-141.16).
 - b. Maximum Contaminant Level Goals (40 CFR 141.50-141.51, 50 FR 46936).

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

- Clean Water Act (33 U.S.C. 1251)
Requirements established pursuant to sections 301 (effluent limitations), 302 (effluent limitations), 303 (water quality standards, including State water quality standards), 304 (Federal water quality criteria), 306 (national performance standards), 307 (toxic and pretreatment standards, including Federal pretreatment standards for discharge into publicly owned treatment works, and numeric standards for toxics), 402 (national pollutant discharge elimination system), 403 (ocean discharge criteria), and 404 (dredged or fill material) of the Clean Water Act, (33 CFR Parts 320-330, 40 CFR Parts 122, 123, 125, 131, 230, 231, 233, 400-469). Available ambient Water Quality Criteria Documents are listed at 45 FR 79318, November 28, 1980; 49 FR 5831, February 15, 1984; 50 FR 30784, July 29, 1985; 51 FR 22978, June 28, 1986; 51 FR 43665, December 3, 1986; 51 FR 8012, March 7, 1986; 52 FR 6213, March 2, 1987.
- EPA's Statement of Procedures on Floodplains Management and Wetlands Protection. (40 CFR Part 6 Appendix A) e/

3. Office of Air and Radiation

- Clean Air Act (42 U.S.C. 7401)
 - a. National Emissions Standards for Hazardous Air Pollutants for Asbestos and Wet Dust particulates, (40 CFR 61.140-61.156), and for other hazardous substances (40 CFR Part 61 generally). See also effluent limitations and pretreatment standards for Wet Dust Collection (40 CFR 427.110-427.116) and 40 CFR Part 763.
 - b. Standards of performance for new stationary sources, including new incinerators (42 U.S.C. 7411), (40 CFR Part 60).

4. Other Federal Requirements

- OSHA requirements for workers engaged in response or other hazardous waste operations (29 CFR 1910.120).
- Occupational Safety and Health Act of 1970 (29 U.S.C. 651).
 - a. Occupational Safety and Health Standards (General Industry Standards) (29 CFR Part 1910).
 - b. The Safety and Health Standards for Federal Service Contracts (29 CFR Part 1926).
 - c. The Health and Safety Standards for Employees engaged in Hazardous Waste Operations. (50 FR 45654).
- Department of Transportation Rules for the Transportation of Hazardous Materials, 49 CFR Parts 107, 171.1-172.558.
- Endangered Species Act of 1973, 16 U.S.C. 1531. (Generally, 50 CFR Parts 81, 225, 402).
- Wild and Scenic Rivers Act, 16 U.S.C. 1271.
- Fish and Wildlife Coordination Act, 16 U.S.C. 661 note.
- Fish and Wildlife Improvement Act of 1978, and Fish and Wildlife Act of 1956, 16 U.S.C. 742a note.
- Fish and Wildlife Conservation Act of 1980, 16 U.S.C. 2901. (Generally, 50 CFR Part 83).

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

4. Other Federal Requirements (Cont.)

- Farmland Protection Policy Act, 7 U.S.C. 4201. (Generally, 7 CFR Part 658).
- Rivers and Harbors Act (33 U.S.C. 403).

5. State Requirements

- Title 35: Env. Prot. Act Subtitle B:

a. Air Pollution Chapter T: Subchapter C:

- 35 IAC 212.121-125,
- 35 IAC 212.421

b. Air Pollution Subchapter A:

- 35 IAC 201.151

c. Air Pollution Subparagraph A: Permits

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 - 35 IAC 231.140,
 - 35 IAC 231.150,
 - 35 IAC 231.160,
 - 35 IAC 231.180,
 - 35 IAC 231.190,
 - 35 IAC 231.200,
 - 35 IAC 231.210,
 - 35 IAC 231.230,
 - 35 IAC 231.240,
 - 35 IAC 231.250,
 - 35 IAC 231.260,
 - 35 IAC 231.320,
 - 35 IAC 309.1.1-191
 - e. Air Pollution Subchapter K:
 - 35 IAC 240.103-104,
 - 35 IAC 240.121
 - 35 IAC 243.104-108,
 - 35 IAC 243.121-126
- Title 35: Env. Prot. Subtitle C:
 - a. Water Pollution Subpart B: General Use Water Quality Standards
 - 35 IAC 302.208
 - 35 IAC 302.210
 - 35 IAC 3044.120-126,
 - 35 IAC 3044.201-206,

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- Title 35: Env. Prot. Subtitle C: (Cont.)
 - a. Water Pollution Subpart B: General Use Water Quality Standards (Cont.)
 - 35 IAC 3044.301,
 - 35 IAC 306.201,
 - 35 IAC 306.302-306,
 - 35 IAC 306.401-406,
 - 35 IAC 309.201-282
 - b. Water Pollution Subpart C: Public and Food Processing Water Supply Standards
 - 35 IAC 302.304
 - 35 IAC 304.102-106,
 - 35 IAC 304.141,
 - 35 IAC 305.102-103,
 - 35 IAC 305.306,
 - 35 IAC 305.102,
 - 35 IAC 307.101-105
- Title 35: Env. Prot. Subtitle F:
 - a. Public Water Supplies Subpart B:
 - Chemical and Physical Quality 35 IAC 604.202
 - Public Water Supplies 35 IAC 604.203-204, 605.103
- Title 35 Env. Prot. Act Subtitle G:
 - a. Waste Disposal C:
 - 35 IAC 700.101-504,
 - 35 IAC 702.101-187,
 - 35 IAC 703.101-246,
 - 35 IAC 704.101-203,
 - 35 IAC 705.121-212,
 - 35 IAC 720.101-122,
 - 35 IAC 721.101-133,
 - 35 IAC 722.110-131,
 - 35 IAC 724.101-451,
 - 35 IAC 725.101-530,
 - 35 IAC 726.120-180,
 - 35 IAC 730.101-152 Dept. of Mines and Minerals Rule IIA,
 - 35 IAC 809.101-802,
 - 35 IAC 811

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- Title 35 Env. Prot. Act Subtitle G: (Cont.)
 - b. Sanitary Landfills Subpart E: Closure and Postclosure
 - 35 IAC 807.301-315,
 - 35 IAC 807.318,
 - 35 IAC 807.501-524,
 - 35 IAC 807.600-666
- Title 35 Env. Prot. Act. Subtitle H:
 - a. Noise
 - 35 IAC 902.101,
 - 35 IAC 902.102,
 - 35 IAC 902.120-125,
 - 35 IAC 902.140-141
- Title 92 IL Adm. Code, Transportation Subchapter C:
 - a. Haz. Mat.
 - 92 IAC 171.1-317,
 - 92 IAC 172.1000-2215,
 - 92 IAC 173.2000-3000
- Illinois Water Well Construction Code Law
(Ill. Rev. Stat. 1987 Ch. 111 1/2, pars. 116, 111-118, as amended)
- Illinois Water Well and Pump Installation Contractors Licensing Act
(Ill. Rev. Stat. 1987 Ch. 111, pars. 7101-7130, as amended).
- PA 85-1195 Part I:
Hazardous Waste Crane and Hoisting Equipment Operators Licensing Act (S.H.A. Ch. 11, par. 7701 et seq., as amended)
- I.D.O.T.
Dir. of Highways
Sec. 15 Ill. Vehicle Code Based on Federal Bridge Formulas
- State Field Sampling Procedures

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APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

OTHER FEDERAL AND STATE CRITERIA, ADVISORIES, AND GUIDANCE TO BE CONSIDERED a/

1. Federal Criteria, Advisories, and Procedures

- Health Effects Assessments (HEAs) and Proposed HEAs, ("Health Effects Assessment for (Specific Chemicals), "ECAO, USEPA, 1985).
- Reference Doses (RfDs), ("Verified Reference Doses of USEPA," ECAO-CIN 475, January 1986). See also Drinking Water Equivalent Levels (DWELs), a set of medium-specific drinking water levels derived from RfDs. (See USEPA Health Advisories, Office of Drinking Water, March 31, 1987).
- Carcinogen Potency Factors (CPFs) (e.g., Q1 Stars, Carcinogen Assessment Group [CAG] Values), (Table 11, "Health Assessment Document for Tetrachloroethylene (Perchloroethylene)," USEPA, OHEA/6008 82/005F, July 1985).
- Waste load allocation procedures, EPA Office of Water (40 CFR Part 125, 130).
- Federal Sole Source Aquifer requirements (see 52 FR 6873, March 5, 1987).
- Public health criteria on which the decision to list pollutants as hazardous under Section 112 of the Clean Air Act was based.
- Guidelines for Groundwater Classification under the EPA Groundwater Protection Strategy.
- Advisories issued by PWS and NWPS under the Fish and Wildlife Coordination Act.
- OSHA health and safety standards that may be used to protect public health (non-workplace).
- Health Advisories, EPA Office of Water.
- EPA Water Quality Advisories, EPA Office of Water, Criteria and Standards Division.

2. USEPA RCRA Guidance Documents

- Interim Final Alternate Concentration Limit Guidance Part 1: ACL Policy and Information Requirements (July, 1987)
 - a. EPA's RCRA Design Guidelines
 - b. Permitting Guidance Manuals
 - c. Technical Resource Documents (TRDs)
 - d. Test Methods for Evaluating Solid Waste

3. USEPA Office of Water Guidance Documents

- a. Pretreatment Guidance Documents
- b. Water Quality Guidance Documents
- c. NPDES Guidance Documents
- d. Groundwater/UIC Guidance Documents
- e. Groundwater Protection Strategy (August 1984).
- f. Clean Water Act Guidance Documents

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

OTHER FEDERAL AND STATE CRITERIA, ADVISORIES, AND GUIDANCE TO BE CONSIDERED a/

4. USEPA Manuals from the Office of Research and Development
 - SW 846 methods - laboratory analytic methods (November 1986)
 - Lab protocols developed pursuant to Clean Water Act Section 304(h)
5. Nonpromulgated State Advisories
 - State approval of water supply system additions or developments.
 - State groundwater withdrawal approvals.
 - Superfund program groundwater cleanup goals.
 - Recommended allowable drinking water limits.
 - 10^{-5} risk level.

Source: EPA CERCLA COMPLIANCE WITH OTHER LAWS MANUAL; May 6, 1988 (OSWER Directive 9234.1-01).

- a/ This is the list of potentially applicable or relevant and appropriate requirements found in the October 2, 1985, Compliance Policy with additions. As additional requirements are promulgated, they will be considered potentially applicable or relevant and appropriate and added to this list.
- b/ In authorized States, Federal regulations promulgated under RCRA are not applicable as a State requirement until the State adopts those regulations through its own legislative process, but probably would be relevant and appropriate as a federal requirement. Federal regulations promulgated pursuant to the Hazardous and Solid Waste Amendments of 1984, however, are effective immediately in all 50 states, and are potentially applicable as Federal requirements.
- c/ 40 CFR Part 264 regulations apply to permitted facilities and may be relevant and appropriate to other facilities.
- d/ Only Subpart F groundwater monitoring requirements under 40 CFR 264 are ARAR. The Subpart F groundwater monitoring requirements under 40 CFR 265 are not ARAR.
- e/ 40 CFR Part 6 Subpart A sets forth EPA policy for carrying out the provisions of Executive Orders 11988 (Floodplains Management) and 11990 (Protection of Wetlands).